(Summary Report)

# Environmental Risk Study

For

City of Chester, Pennsylvania

Conducted by the U.S. Environmental Protection Agency

Region III

in conjunction with the

Pennsylvania Department of Environmental Resources

June, 1995

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The U.S. Environmental Protection Agency wishes to acknowledge the cooperation and support efforts of the Pennsylvania Department of Environmental Resources(PADER), the PADER Region I Office, the Pennsylvania Department of Health, Bureau of Epidemiology, the Delaware County Commissioners, Chester City Council, Mayor Barbara Bohannon-Shepard, Chester Citizens Concerned for Quality Living, Public Interest Law Center of Philadelphia, Delaware Valley Toxics Coalition, and Pacific Environmental Services Inc.

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This report is a condensed version of the **Chester Risk Study, Technical Support Document** written by staff at the U.S. Environmental Protection Agency Region III Office in Philadelphia, Pennsylvania and which is currently undergoing a scientific peer review as required by Agency policy.

The U.S. Environmental Protection Agency (EPA) policy for releasing technical studies of the type outlined in this summary document is that they must clear the peer review process prior to release to the public. The interim draft report summary presented here is being made available to the public for a dual purpose:

1.) in order to begin the follow up and mitigation process necessary to better define and subsequently reduce the risks to human health in the City of Chester, Pennsylvania.

2.) to provide general guidance as a "model protocol" related to methods of performing aggregated risk studies at other locations. It is generally accepted that cumulative risk studies are needed to provide technical information and a framework for decision-making related to proposed and/or current sources of pollution.

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# Environmental Risk Study for the City of Chester, Pennsylvania

The Chester Risk Assessment Project was part of an initiative by the United States Environmental Protection Agency (USEPA) Region III and agencies of the Commonwealth of Pennsylvania to study environmental risks, health, and regulatory issues in the Chester, Pennsylvania area.

## Study Conclusions and Recommendations

### CONCLUSIONS

1 - Blood lead levels in the children of Chester is unacceptably high with over 60% of the children's blood samples above the Center for Disease Control(CDC) recommended maximum level of 10 micrograms per deciliter(μg/dl).

2 - Both cancer and non-cancer risks, e.g. kidney and liver disease and respiratory problems, from the pollution sources at locations in the city of Chester exceed levels which EPA believes are acceptable.

3 - Air emissions from facilities in and around Chester provide a large component of the cancer and non-cancer risk to the citizens of Chester.

4 - The health risks from eating contaminated fish from streams in Chester and the Delaware River is unacceptably high.

5 - Drinking water in Chester is typical of supplies in other cities throughout the country.

### RECOMMENDATIONS

1 - The lead paint education and abatement program in the City of Chester should be aggressively enhanced.

2 - Sources of air emissions which impact the areas of the city with unacceptably high risk should be targeted for compliance inspections and any necessary enforcement action.

3 - A voluntary emission reduction program should be instituted to obtain emissions reductions from facilities which provide the most emissions in the areas of highest risk.

4 - Enhanced public education programs to communicate the reasons behind the existing state mandated fishing ban should be implemented.

5 - While fugitive dust emissions have not shown to be a significant component of risk in the City, a program to minimize fugitive emissions from dirt piles and streets should be instituted to alleviate this nuisance.

6 - While noise and odor levels were not shown to be a significant component of risk in the City, a noise and odor monitoring program should be instituted in areas most likely to suffer from these nuisances. If significant levels are found, a noise and/or odor reduction program should be implemented in those areas.

## Study Method and Procedures

### Background

The City of Chester is located approximately 15 miles southwest of Philadelphia along the Delaware River. According to the 1990 United States Census, 41,856 persons reside in Chester, which has an area of 4.8 square miles. Surrounding communities also examined in development of this report include Eddystone, Trainer, Marcus Hook, and Linwood. Major surface transportation routes transect Chester including Interstate 95, and US Route 13, which parallels Interstate 95 to the east. US Route 322 bisects Chester from northwest to southeast.

Drinking water for the City of Chester is supplied by the Chester Water Authority (CWA) and Philadelphia Suburban Water Company (PSWC).

Large sources of surface water in the City of Chester include Chester Creek and the Delaware River. All streams in the Chester vicinity ultimately drain into the Delaware River in a branching pattern. The Delaware River is a protected waterway for the maintenance and propagation of fish species that are indigenous to a warm-water habitat.

The hydrogeologic conditions that exist beneath the study area are highly dynamic in nature. Water levels are influenced by tides and high rates of infiltration from storms.

### Methodology

A key element in the project scope called for environmental risks to be quantitated wherever possible, and supplemented with qualitative information.

Chemical data were gathered from existing sources. The scope of this project did not include collection of new data specifically designed for a Chester risk assessment. Instead the

workgroup performed an examination of available data which yielded the following observations:

- The data had been collected for different programs and different agencies. These data were not originally designed to support a quantitative risk assessment of the Chester area.

- The databases were of varying quality, and certain chemicals and media had not been tested. However, with the limited data available, it was possible for many data sets to be used to generate estimated risks.

Modeling of air data from point sources preceded the air risk assessment, such that point source air risks are based on projected data rather than data actually collected in the field. The lead (Pb) data, area sources of volatile organic compound (VOC) emissions, Resource Conservation and Recovery Act (RCRA) site information, and Toxic Release Inventory (TRI) data did not involve the types of environmental data conducive to quantitative risk assessment.

In a risk assessment, the hazards posed by chemicals detected by chemical analysis are evaluated. Potential risks may exist when chemicals are present in the air, water and soils and sensitive receptors(i.e.humans,wildlife, and plantlife) are present which have access to the chemicals. This constitutes a complete exposure pathway.

To evaluate risks, several steps are taken. First, the data are assessed for usability and comparability. Data may then undergo statistical manipulations for use in the quantitative risk assessment. An initial screening step occurs during data evaluation for the purpose of narrowing down the list of chemicals that are quantitatively assessed. Using conservative assumptions, the chemical concentrations that would correspond to the lower end of the target screening risk range[1] are calculated. These concentrations are called risk-based concentrations(RBCs), and are compared to the site data during the data evaluation stage to rule out chemicals that will not contribute significantly to risks at the site.

Exposure pathways are then determined. The receptors that

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[1] target screening risk range: within the EPA Superfund program defines acceptable cancer risks as those which do not exceed the established range of 1E-06 to 1E-04. This range corresponds to an additional cancer risk of 1 in one million(1E-06) to 1 in 10,000(1E-04) from exposure to a given chemical. The lower, more conservative -- and more protective -- end of this range is 1E-06.

For non-cancer-causing chemicals, the ratio between the calculated potential dose and the dose known to be safe should not exceed one.

may be exposed are also chosen. Both current and future land uses must be considered. Using site-specific or default assumptions, estimated exposure doses are calculated for each receptor.

Once the amount of exposure each receptor receives has been calculated, that amount or dose is compared with values designed to assess the safety or toxicity of a chemical. This step, which is called risk characterization, helps the risk assessor determine the likelihood of adverse effects occurring for that exposure scenario.

Finally, the uncertainty of the risk analysis is described, either quantitatively, qualitatively, or both. This step helps give a more complete picture of environmental risks, and helps risk managers weigh their options in addressing potential hazards.

The data were examined in order to determine chemicals of potential concern (COPCs). COPCs are defined as those substances that are potentially related to the risk source being studied and whose data are of sufficient quality for use in the risk assessment. It is appropriate to select COPCs for each medium of concern.

Data were often screened using RBCs. RBCs were used to determine whether, if included in the risk assessment, the chemical would be likely to contribute significantly to the risk.

UNCERTAINTY ANALYSIS

Uncertainty associated with the assessment of risk may be associated with exposure estimation, toxicity assessment, and in risk characterization. The policy of the USEPA is to be protective of human health and the environment. In accordance with this policy, exposure estimates and the parameters used in the characterization of the exposures are of a conservative nature whenever possible. These conservative parameters are designed to ensure that all estimates are protective and that all sensitive subpopulations are considered. Some of these exposure parameters may be overestimates of the actual exposures experienced by receptors.

## Study Findings

### Children's Blood Lead Investigation

Historically, inorganic lead has been released to the environment by many human activities such as mining, smelting, use of leaded gasoline, and manufacturing of batteries, plastics,

and chemicals. Lead is not volatile, so it usually moves through the air as fine dust which deposits and contaminates soil within a few miles of its source. People can be exposed to lead in air, food, drinking water (and beverages), soil and dust, and across the placenta before birth.

Important toxic effects of lead include anemia, hypertension, and damage to the kidneys, testicles, and nervous system. Small children are most sensitive to toxic effects of lead because they suffer significant losses in motor skills and cognitive ability at lead doses which do not affect adults. EPA considers children with blood lead levels of 10 or more micrograms of lead per deciliter of blood to be at risk of irreversible damage to the nervous system.

Chester officials provided records of over 10,000 blood lead measurements for children, which EPA entered into a computer database. Age and gender were not reported(although all were reported to be seven years or younger at the time of the test), nor was information available about how the children were chosen for blood lead sampling. Lead concentration data for air, tap water, soil, dust, and food were not available. This limited database allowed EPA to compare blood lead levels in Chester with those in similar Eastern cities, but did not support conclusions about sources of lead exposure.

Average blood lead levels in Chester between 1989 and 1993 (Figure 4-16) were higher than 1990 averages in Boston, Baltimore, or Cincinnati. However, blood lead in Chester decreased significantly during this five-year period, so that in 1992 and 1993 Chester blood lead levels were similar to those in Baltimore. With the limited database it was not possible to tell if the decline in blood lead was real or artificial (caused by sampling different groups of children or by medically treating children with high blood lead levels).

EPA compared the Chester blood lead observations with predictions from a computer model that predicts blood lead. Because lead levels in Chester's air, water, soil, and food were not available, EPA used national averages to make the predictions. To match the Chester blood lead data it was necessary to add 130 micrograms of lead intake per day to the national averages.

EPA determined the average blood lead level for each residence by combining multiple measurements from the same child and from siblings. A map of blood lead levels in Chester was prepared. The map showed no noticeable patterns of blood lead; there appears to be no part of Chester where blood lead is higher or lower than the others.

Overall, EPA's analysis of blood lead suggests that:

1. Recent measurements of Chester children blood lead levels are similar to those in similar Eastern U.S. cities.

2. Children in Chester receive lead exposures which are substantially higher than the U.S. average.

3. It is not possible with the limited data available to tell the source of the children's excess lead exposure.

4. The problem of high blood lead appears to be city-wide rather than confined to specific neighborhoods.

AIR

Modeled Air Concentrations

As was previously noted, no new data was gathered for this study. The recent years air data that existed was often developed for specific purposes,e.g. compliance monitoring of permitted emission parameters, or was presented in format which was not compatible for risk calculation purposes. This presented a pattern of data gaps in an important medium of concern, air.

It was decided that sufficient information existed regarding the industry types, geographical locations, and production capabilities, and that meteorologic data combined with actual or generic emission levels could be utilized in a computer modeled simulation of speciated ambient air quality.

Estimated air concentrations for 699 chemicals were provided for approximately 1400 locations in Chester City. Of the pollutants assessed, 640 are gaseous in nature, while 59 exist as particulate matter[2].

Although emission contributions from many sources were modeled, only the total concentration of each pollutant at each location was considered in risk calculations. Of the 699 chemicals evaluated, 122 have toxicity values in the form of reference dose(RfDs) or cancer slope factors(CSFs). Five of the modeled chemicals are criteria pollutants, and are regulated under the authority of the Clean Air Act via the National Ambient Air Quality Standards (NAAQS).

For chemicals with reference doses (RfDs) or cancer slope factors (CSFs), modeling results were screened using RBCs as described above to identify chemicals of potential concern (COPCs). Accordingly, inhalation under a standard residential exposure scenario was considered. In instances where both an RfD and a CSF exist for a given COPC, only the most sensitive

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[2] small solid particles like dust which move with air currents

endpoint (cancer or non-cancer) was evaluated.

Estimated criteria pollutant concentrations were compared to the NAAQS. (This approach for evaluating potential threats is similar to the methodology employed for assessing non-cancer threats posed by chemicals with RfDs.)

For gasoline and diesel, carcinogenic risks were assessed based upon respective unit risks for these compounds, as determined by a recent USEPA investigation (USEPA, 1993c).

For the criteria pollutants, predicted concentrations at each grid location were compared to NAAQSs.

Individual Risks

At various locations in Chester, several chemicals were predicted to exist in air at concentrations of potential concern. Chromium VI was determined to contribute the most to carcinogenic[3] risk at any given location, while hydrogen chloride presents the greatest non-cancer threat. A summary of the highest individual risks in Chester City is presented in Table 4-32 for carcinogenic COPCs, and in Table 4-33 for COPCs with non-cancer endpoints.

None of the predicted concentrations of criteria pollutants in Chester exceeded NAAQSs, as illustrated in Table 4-34.

Cumulative Risks

Cumulative carcinogenic risks and non-cancer threats are predicted to exceed levels considered safe at several locations in Chester City. The range of aggregate carcinogenic risks in Chester as a result of inhalation is estimated to be 1.1E-5 to 6.6E-5[4]. For non-cancer endpoints, the range of Hazard indices(HI) is predicted to be 1.0 to 3.8. The risks are also displayed on Figures 4-29, 4-30, 4-31, 4-32, 4-33, and 4-34.

Cumulative values for the criteria pollutants were estimated to range from 0.6 to 1.6. This is illustrated on Fig. 4-35.

It is possible to discuss the culpability of various sources of air pollution to these risks. As outlined in the section on

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[3] cancer causing

[4] 1.1E-05 is a scientific notation used in risk characterization to express an excess cancer risk in the general population of 1.1 persons out of 100,000 would be expected to incur(not die from cancer but incur a cancer) a cancer above and beyond the normal incidence of cancer.

air quality modeling, a large number of sources was modeled, the sources vary dramatically in their contribution to both carcinogenic risk and noncarcinogenic hazards.

Point sources accounted for roughly 40 percent of environmental carcinogenic risk in Chester and more than half of the sub-chronic risk. Delcora and Sun each contribute roughly one quarter of the long-term cancer risk. Delcora and P.Q. Inc. emit chromium and arsenic, Delcora emits those and other heavy metals, and Sun emits many organic species. DuPont and Westinghouse account for approximately 80 percent of the non-cancer risk.

Area Source Emissions

County-wide estimated emissions were available for area sources of air contaminants. These data were not conducive to the performance of a quantitative risk assessment because of the difficulty in identifying individual chemicals and separating the Chester area out from the county. However, a qualitative/semi-quantitative assessment follows.

Sources of toxic air releases which are small when evaluated individually, but are significant when combined with other facilities of similar type in a given geographic area are termed area sources. Volatile organic compounds (VOCs) are of particular concern because some are classified by USEPA as probable or possible human carcinogens. Also, they photochemically combine with oxides of nitrogen ($NO_x$) and carbon monoxide (CO) in the presence of sunlight to form ozone, which causes respiratory problems and plant damage.

Information about area sources comes from two sources of data. Information about the location, industry type, and number of employees is available through Dun and Bradstreet. Information about the amount of VOCs released per employee per year is available in USEPA, 1991d. Combining these two databases gives an estimate of VOC emissions per facility per year.

A list of facilities with Standard Industrial Classification (SIC) codes between 4000 and 9999 (which include businesses such as transportation services, gasoline service stations, automobile repair shops, and dry cleaners), and within the study area was retrieved from the Dun and Bradstreet (D&B) data base. [Facilities with SIC codes between 2000 and 3999 (manufacturing) are reported in the TRI data base and are evaluated in the Air Toxics Modeling portion of the study].

A grid system was established for the study area, with each grid square approximately one square kilometer (or about 1/2 mile by 1/2 mile), and the sum of the estimated emissions for each

facility within a given grid square was calculated. The values for the grid system were assigned colors from red to green, with grey indicating no facilities.

Fig. 4-36 shows the estimated emissions for all the grid squares in the study area. Fig. 4-37 highlights the top 9 (15%) grid squares, which represent estimated annual releases of VOCs of over 40,000 pounds. Fig. 4-38 shows the minority distribution of the study area with the 9 high squares indicated in cross-hatching. This indicates that grid squares 6, 7, and 8 are in an area with a very high percentage of minority population, indicating that the potential for impact to the minority community is greatest in these areas.

There are several limitations to the approach used to estimate the VOC emissions for the area sources. First, the D&B data base does not contain every facility in the study area that releases VOCs. In addition, the estimates of VOC releases are based on studies of "typical" facilities and are not actual measures of the releases from the facilities in the study area. The actual type and amount of VOC releases is not available. The estimates are not identified for the specific SIC codes that were identified in the D&B database, so that approximate values were used instead of SIC code-specific ones.

EPIDEMIOLOGICAL ISSUES

A study of the existing public health status of the community and a specific epidemiological study to try to establish cause-and-effect links between environmental risks and health effects were beyond the scope of the environmental risk project. However, the state health department, as a preliminary exercise, looked at the mortality rate for certain diseases in the city as compared to the state and county. This exercise may be found in **Appendix III**. This may give useful information regarding the existing health of the community, although it cannot be used to establish causes of the health conditions.

Surface Water, Sediment, Fish Tissue

Three main data sources were used for surface water, sediment, and fish tissue data: the STORET database, CERCLIS files, and the National Study of Chemical Residues in Fish.

The CERCLIS database was described previously. Five CERCLIS sites in the Chester study area had surface water and/or sediment data. These sites underwent data quality review in accordance with the Quality Assurance Plans under which the work was authorized.

The National Study of Chemical Residues in Fish was

performed by USEPA to study fish tissue contamination nationwide (USEPA, 1992b). This study began as an outgrowth of the National Dioxin Study, which found notable concentrations of dioxins in fish tissue. It involved the collection of fish tissue from over 300 stations nationwide.

One station from this study was located within the Chester study area, and these fish tissue results were used for the Chester risk assessment. Analytical data were obtained in accordance with the analytical procedures and quality assurance plans cited in the national study.

Table 4-23 presents the risks associated with direct contact with surface water at each location. It can be seen that the Hazard Indices for each location are less than 1, indicating that significant adverse non-cancer health effects due to contact with surface water at the reported concentrations are not expected. Estimated cancer risks are at or below 1E-6 for all locations except the Delaware County Incinerator Landfill #1 (3.9E-5). The cancer risk at this site was based on arsenic and beryllium in a drainage ditch water sample taken adjacent to the landfills. The water sample was reported as "greenish brown" and is likely to have contained high amounts of suspended solids. The feasibility of people actually swimming in a drainage ditch depends upon its depth and width, seasons of flow, and may also depend upon its aesthetic appeal.

Table 4-24 presents the risks associated with direct contact with sediment at each location. It can be seen that the Hazard Indices for each location are less than 1, indicating that significant adverse non-cancer health effects due to contact with sediment at the reported concentrations are not expected. Estimated cancer risks were all below 1E-5.

It is likely that most of the general population of Chester does not consume locally-caught fish. However, subpopulations may exist consisting of occasional fishers or possibly even subsistence fishers. Subsistence fishers could have risks higher than those quantitated herein.

Drinking Water

This study investigated the drinking water quality of both private and public well users in the City of Chester and surrounding municipalities including Marcus Hook Borough, Trainer Borough, Chester City, Chester Township, Linwood, Upland Borough and Eddystone Borough. The potability of the groundwater in the study area and potential risk to private well users was evaluated by qualitative assessment of the existing monitoring well data from Comprehensive Environmental Response, Compensation, and Liabilities Information System (CERCLIS) and Resource

Conservation and Recovery Act (RCRA) sites. Environmental equity issues that would require further study were identified where appropriate with respect to the data obtained to date.

Private Well Investigation

The U.S.Department of Census data obtained in 1990 involved a random door-to-door survey of the housing units (both vacant and occupied) in the study area (see Table 4-1). An assessment of the data indicated that less than 1% of the housing units in the study area may obtain their drinking water source from private wells. The Chester Water Authority and Health Departments are not aware of any residential properties using local groundwater for drinking or bathing purposes. The local health department indicated that the entire population of Chester is connected to a public water supply(PWS). However, the health department did acknowledge that verification that none existed would be quite difficult. Based on U.S. Census data there are an estimated 61 private wells in the study area, of which approximately 31 are believed to be dug wells and approximately 30 are believed to be drilled wells. The data are extrapolations, from a smaller sample size, of the actual figures that would have been obtained from a complete count (USDOC, 1990). Therefore, the exact number of private wells in the study area is largely unknown.

Efforts to obtain locational information for any of the 61 private wells identified on the census tract (Figure 4-2) have been hampered primarily because of those regulations which protect census participants individual rights to privacy. It should be noted that information retrieval from the census tract is limited to a scale of census blocks which are a geographic area of about 200 people.

Public Water Supply

Drinking water quality from public water sources in the study area was investigated because greater than 99% of the population is expected to obtain their drinking water from a public supply. The study area is served by the Chester Water Authority except for Eddystone, which is served by the Philadelphia Suburban Water Company. It should be noted that Philadelphia Suburban Water Company purchases water for Eddystone from the Chester Water Authority. This water undergoes no additional treatment; therefore, the actual source of drinking water for Eddystone is the Chester Water Authority.

Tables 4-3, 4-4, and 4-5 summarize risks for the 1-year and 30-year exposure scenarios for the PWSs.

TOXIC RELEASE INVENTORY (TRI)

The TRI database contains information about chemical releases from industrial manufacturers and processors (primary Standard Industrial Classification (SIC) codes 20-39) to the environment. Since 1987, facilities meeting established thresholds have been required to report release data according to section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA).

Region III has developed a method for evaluating these releases in terms of their relative toxicity. This method is documented in the Chemical Indexing System for the Toxic Chemical Release Inventory Part I: Chronic Index (USEPA, 1993d). The Chemical Indexing analysis provided in the present report displays the 1992 TRI data in terms of the Chronic Index (toxicity-weighted releases) and Residual Mass (non-weighted releases) for Region III, highlighting TRI facilities in Delaware County, Pennsylvania.

The Regional maps (Figures 4-26, 4-27, and 4-28) show TRI releases in terms of the Chronic Index, including non-carcinogenic and/or carcinogenic index dose. Those releases which do not have an associated toxicity factor are combined according to the amount of the release and are termed Residual Mass. The resultant Chronic Indices and Residual Mass values are summed for each facility and for each 8 x 8 mile geographic grid area in Region III. Combining the facility Chronic Indices within a geographic grid gives an indication of the potential for cumulative hazard from TRI facilities within a given geographic area.

In Delaware County, 28 facilities were subject to TRI reporting under EPCRA for the reporting year (RY) 1992. A summarized priority listing of these facilities is included in Table 4-27 and a complete listing is provided in Tables 4-28 and 4-29. Table 4-27 shows a quantitative summary of the facilities which ranked in the top 90th percentile - 95% confidence of the 28 facilities subject to reporting under EPCRA. Table 4-27 shows the top six TRI facilities in the Chronic Index and Residual Mass ranking.

It has not been determined whether these releases were continuous for the entire year or if they reflect one-time accidental releases or spills. In addition, the proximity of these releases relative to potentially exposed populations has not been established. The determination of a potential health threat of the volumes released depends on the proximity of the stack to residential areas, the surrounding terrain and the meteorological conditions. Furthermore, should it be determined that additional analysis is required at any site listed in this report, documentation which identifies these release as continuous or intermittent should be obtained prior to the

analysis.

## OTHER ENVIRONMENTAL CONCERNS

One of the study objectives was to be responsive to environmental concerns raised by the citizens in the study area. Some of these were issues for which USEPA had no available database and could therefore not assess with quantitative risk assessment. These issues included odors and noise and are addressed below.

### Odors

Odor is a very difficult sensory phenomenon to describe objectively. Many attempts and subsequently many descriptors have been utilized in trying to describe the human olfactory system and especially its variability, thresholds and the time duration aspect of the sensation.

It is key to understand that many odors may be perceived at concentrations as low as 1 part per billion (e.g. ammonia ethylacrylate, isopropylmercaptan), while still others can be detected as low as 1 part per trillion (e.g. n-butyric acid). The mere ability to sense an odor does not necessarily mean that it is harmful at threshold levels. On the other hand, some chemicals which are potentially harmful at low concentrations may not be perceived by most humans at levels which are significantly harmful. This certainly exacerbates individual fears and adds to stress associated with the perceived odors which people encounter.

A major source of concern in the Chester neighborhoods are the odors which seem to emanate from the large industries along the Delaware River coastline. It may be that individual small industrial or commercial operations could be sources of these emissions.

Although the incidence of odor complaints has been one of the greatest concerns in Chester, the pervasiveness of odor could not be addressed quantitatively in the environmental risk assessment. This does not diminish the importance of odors to residents, nor is it meant to ignore or screen them out of the assessment. There were virtually no data available at the onset of the study related to odors.

For purposes of this report, odors are being considered only as a source of further investigation. They are a nuisance which may add to the overall stress of residing in an urbanized environment.

### Noise

Many residents of Chester have complained that environmental noise diminishes the quality of life they experience in a home setting. They cite numerous sources of the noise and have requested help from the industrial community and the environmental agencies in reducing noise to acceptable, non-intrusive levels. Some of the sources identified include:

- truck traffic passing through residential areas
- industrial operating equipment
- aircraft over-flights
- music sources, such as car radios, home hi-fi
- train pass-by

As part of the Chester Risk Project, USEPA staff reviewed applicable environmental noise studies performed in the Chester area and performed a literature search for any applicable mitigation measures. This limited search found a Pre-Operational Noise Monitoring Study (Westinghouse, 1991) and a subsequent Noise Report Summary (Westinghouse, 1993).

In the study, environmental noise monitoring was performed at seven locations. This was considered to be background noise monitoring, at facility site locations, prior to final construction and operation of the Delaware County Resource Recovery facility. A total of three continuous 24-hour time periods were sampled including one weekend day and two weekdays. An additional four locations were sampled in the residential community in February 1991 in areas adjacent to the Resource Recovery facility.

Although there was some variability in the measured noise data due to short-duration transient events, the levels measured in and around the facility and in the residential neighborhoods are typical of urban residential settings and would be considered generally acceptable.

A noise control ordinance for the City of Chester, Pennsylvania was passed on January 14, 1993. This ordinance applies to vehicles, appliances and equipment, and includes many of the "nuisance" type of unwanted sounds. The ordinance includes subjective aspects of noise as well as objective criteria limits for motorized vehicles and property line limits depending on land use zoning.

# APPENDIX I

## TABLES

CHESTER RISK PROJECT
TABLE 4-1
U.S. CENSUS OF POPULATION AND HOUSING - STF- 3A SAMPLE COUNT DATA (1990)*
SUMMARY

| Area | Total Housing Units | Occupied Housing Units | Vacant Housing Units | Public | Drilled Well | Dug Well | Other |
|---|---|---|---|---|---|---|---|
| Marcus Hook Borough | 1055 | 990 | 65 | 1055 | 0 | 0 | 0 |
| Trainer Borough | 912 | 871 | 41 | 902 | 7 | 3 | 0 |
| Chester City | 16,512 | 14,538 | 1,975 | 16,445 | 18 | 22 | 26 |
| Chester Township CDP | 1,879 | 1,778 | 101 | 1,868 | 5 | 6 | 0 |
| Linwood | 1,190 | 1,123 | 67 | 1,190 | 0 | 0 | 0 |
| Upland Borough | 1,224 | 1,187 | 37 | 1,224 | 0 | 0 | 0 |
| Eddystone Borough | 1,071 | 993 | 78 | 1,065 | 0 | 0 | 6 |

* Data obtained from STF 3A, File 29, Tables H22-H33

CHESTER RISK PROJECT
TABLE 4–3
RISK SUMMARY
CHESTER WATER AUTHORITY

| DRINKING WATER ADULT | CANCER RISK | NON–CANCER RISK |
|---|---|---|
| TOTAL RISK FROM ALL SOURCES (1989–ED– 1 YEAR) | 1.34E–07 | 3.95E–01 |
| TOTAL RISK FROM ALL SOURCES (1990–ED– 1 YEAR) | 2.13E–07 | 2.29E–01 |
| TOTAL RISK WITHOUT FLUORIDE (1991–ED– 1 YEAR) | 1.86E–07 | 2.14E–01 |
| TOTAL RISK FROM ALL SOURCES (1992–ED– 1 YEAR) | 1.98E–07 | 2.27E–01 |
| TOTAL RISK WITHOUT FLUORIDE (1993–ED– 1 YEAR) | 1.78E–07 | 2.39E–01 |
| TOTAL RISK WITHOUT FLUORIDE (1993–ED– 30 YEARS) | 4.27E–06 | 2.39E–01 |
| **DRINKING WATER CHILD** | | |
| TOTAL RISK FROM ALL SOURCES (1989–ED– 1 YEAR) | 3.12E–07 | 9.21E–01 |
| TOTAL RISK FROM ALL SOURCES (1990–ED– 1 YEAR) | 4.96E–07 | 5.33E–01 |
| TOTAL RISK WITHOUT FLUORIDE (1991–ED– 1 YEAR) | 4.35E–07 | 4.99E–01 |
| TOTAL RISK FROM ALL SOURCES (1992–ED– 1 YEAR) | 4.62E–07 | 5.31E–01 |
| TOTAL RISK WITHOUT FLUORIDE (1993–ED– 1 YEAR) | 4.15E–07 | 5.57E–01 |
| TOTAL RISK WITHOUT FLUORIDE (1993–ED– 30 YEARS) | 2.49E–06 | 5.57E–01 |
| **INHALATION ADULT** | | |
| TOTAL RISK FROM ALL SOURCES (1989–ED– 1 YEAR) | 2.24E–06 | 0.00E+00 |
| TOTAL RISK FROM ALL SOURCES (1990–ED– 1 YEAR) | 2.90E–06 | 4.47E |
| TOTAL RISK FROM ALL SOURCES (1991–ED– 1 YEAR) | 3.12E–06 | 0.00E |
| TOTAL RISK FROM ALL SOURCES (1992–ED– 1 YEAR) | 3.32E–06 | 0.00E+00 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 1 YEAR) | 2.64E–06 | 0.00E+00 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 30 YEARS) | 6.33E–05 | 0.00E+00 |
| **DERMAL CHILD** | | |
| TOTAL RISK FROM ALL SOURCES (1989–ED– 1 YEAR) | 7.41E–08 | 8.51E–02 |
| TOTAL RISK FROM ALL SOURCES (1990–ED– 1 YEAR) | 1.00E–07 | 1.13E–01 |
| TOTAL RISK FROM ALL SOURCES (1991–ED– 1 YEAR) | 1.03E–07 | 1.18E–01 |
| TOTAL RISK FROM ALL SOURCES (1992–ED– 1 YEAR) | 1.10E–07 | 1.26E–01 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 1 YEAR) | 1.32E–07 | 1.06E–01 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 30 YEARS) | 7.95E–07 | 1.06E–01 |
| **TOTAL RISK*** | | |
| 1989 (1 YEAR) ADULT | 2.37E–06 | 3.95E–01 |
| 1990 (1 YEAR) ADULT | 3.11E–06 | 2.74E–01 |
| 1991 (1 YEAR) ADULT | 3.30E–06 | 2.14E–01 |
| 1992 (1 YEAR) ADULT | 3.51E–06 | 2.27E–01 |
| 1993 (1 YEAR) ADULT | 2.82E–06 | 2.39E–01 |
| 1989 (1 YEAR) CHILD | 3.86E–07 | 1.01E+00 |
| 1990 (1 YEAR) CHILD | 5.96E–07 | 6.46E–01 |
| 1991 (1 YEAR) CHILD | 5.38E–07 | 6.17E–01 |
| 1992 (1 YEAR) CHILD | 5.72E–07 | 6.57E–01 |
| 1993 (1 YEAR) CHILD | 5.48E–07 | 6.63E |
| 1993 (30 YEARS) | 7.09E–05 | 9.02E–01 |

*Total Risk without Fluoride

CHESTER RISK PROJECT
TABLE 4–4
RISK SUMMARY
PHILADELPHIA SUBURBAN WATER COMPANY

| | CANCER RISK | NON–CANCER RISK |
|---|---|---|
| **DRINKING WATER ADULT** | | |
| TOTAL RISK FROM ALL SOURCES (1989–ED– 1 YEAR) | 1.13E–07 | 1.30E–01 |
| TOTAL RISK FROM ALL SOURCES (1990–ED– 1 YEAR) | 1.51E–07 | 1.73E–01 |
| TOTAL RISK FROM ALL SOURCES (1991–ED– 1 YEAR) | 9.72E–08 | 1.12E–01 |
| TOTAL RISK FROM ALL SOURCES (1992–ED– 1 YEAR) | 8.69E–08 | 9.97E–02 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 1 YEAR) | 2.34E–07 | 2.68E–01 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 30 YEARS) | 5.62E–06 | 2.68E–01 |
| **DRINKING WATER CHILD** | | |
| TOTAL RISK FROM ALL SOURCES (1989–ED– 1 YEAR) | 2.65E–07 | 3.04E–01 |
| TOTAL RISK FROM ALL SOURCES (1990–ED– 1 YEAR) | 3.52E–07 | 4.03E–01 |
| TOTAL RISK FROM ALL SOURCES (1991–ED– 1 YEAR) | 2.27E–07 | 2.60E–01 |
| TOTAL RISK FROM ALL SOURCES (1992–ED– 1 YEAR) | 2.03E–07 | 2.33E–01 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 1 YEAR) | 5.46E–07 | 6.26E–01 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 30 YEARS) | 3.28E–06 | 6.26E–01 |
| **INHALATION ADULT** | | |
| TOTAL RISK FROM ALL SOURCES (1989–ED– 1 YEAR) | 1.90E–06 | 0.00E+00 |
| TOTAL RISK FROM ALL SOURCES (1990–ED– 1 YEAR) | 2.52E–06 | 0.00E+00 |
| TOTAL RISK FROM ALL SOURCES (1991–ED– 1 YEAR) | 1.63E–06 | 0.00E+00 |
| TOTAL RISK FROM ALL SOURCES (1992–ED– 1 YEAR) | 1.46E–06 | 0.00E+00 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 1 YEAR) | 3.92E–06 | 0.00E+00 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 30 YEARS) | 9.41E–05 | 0.00E+00 |
| **DERMAL CHILD** | | |
| TOTAL RISK FROM ALL SOURCES (1989–ED– 1 YEAR) | 6.29E–08 | 7.21E–02 |
| TOTAL RISK FROM ALL SOURCES (1990–ED– 1 YEAR) | 8.35E–08 | 9.58E–02 |
| TOTAL RISK FROM ALL SOURCES (1991–ED– 1 YEAR) | 5.39E–08 | 6.18E–02 |
| TOTAL RISK FROM ALL SOURCES (1992–ED– 1 YEAR) | 4.82E–08 | 5.53E–02 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 1 YEAR) | 1.30E–07 | 1.49E–01 |
| TOTAL RISK FROM ALL SOURCES (1993–ED– 30 YEARS) | 7.78E–07 | 1.49E–01 |
| **TOTAL RISK*** | | |
| 1989 (1 YEAR) ADULT | 2.01E–06 | 1.30E–01 |
| 1990 (1 YEAR) ADULT | 2.67E–06 | 1.73E–01 |
| 1991 (1 YEAR) ADULT | 1.73E–06 | 1.12E–01 |
| 1992 (1 YEAR) ADULT | 1.54E–06 | 9.97E–02 |
| 1993 (1 YEAR) ADULT | 4.15E–06 | 2.68E–01 |
| 1989 (1 YEAR) CHILD | 3.28E–07 | 3.76E–01 |
| 1990 (1 YEAR) CHILD | 4.35E–07 | 4.99E–01 |
| 1991 (1 YEAR) CHILD | 2.81E–07 | 3.22E–01 |
| 1992 (1 YEAR) CHILD | 2.51E–07 | 2.88E–01 |
| 1993 (1 YEAR) CHILD | 6.76E–07 | 7.75E–01 |
| 1993 (30 YEARS) | 1.04E–04 | 1.04E+00 |

*Note fluoride is not added to the finished water

CHESTER RISK PROJECT
TABLE 4–5
RISK SUMMARY
PHILADELPHIA WATER DEPARTMENT

| | | | CANCER RISK | NON–CANCER RISK |
|---|---|---|---|---|
| **DRINKING WATER ADULT** | | | | |
| Total Risk without Fluoride (1989–ED– 1 YEAR) | | | 1.63E–07 | 1.87E–01 |
| Total Risk without Fluoride (1990–ED– 1 YEAR) | | | 1.96E–07 | 2.15E–01 |
| Total Risk without Fluoride (1991–ED– 1 YEAR) | | | 1.97E–07 | 2.20E–01 |
| Total Risk without Fluoride (1992–ED– 1 YEAR) | | | 1.41E–07 | 1.61E–01 |
| Total Risk without Fluoride (1993–ED– 1 YEAR) | | | 2.14E–07 | 2.40E–01 |
| Total Risk without Fluoride (1993–ED– 30 YEARS) | | | 5.14E–06 | 2.40E–01 |
| **DRINKING WATER CHILD** | | | | |
| Total Risk without Fluoride (1989–ED– 1 YEAR) | | | 3.80E–07 | 4.37E–01 |
| Total Risk without Fluoride (1990–ED– 1 YEAR) | | | 4.58E–07 | 5.03E–01 |
| Total Risk without Fluoride (1991–ED– 1 YEAR) | | | 4.60E–07 | 5.14E–01 |
| Total Risk without Fluoride (1992–ED– 1 YEAR) | | | 3.28E–07 | 3.77E–01 |
| Total Risk without Fluoride (1993–ED– 1 YEAR) | | | 5.00E–07 | 5.60E–01 |
| Total Risk without Fluoride (1993–ED– 30 YEARS) | | | 3.00E–06 | 5.60E–01 |
| **INHALATION ADULT** | | | | |
| Total Risk from All Sources (1989–ED– 1 Year) | | | 2.73E–06 | 0.00 |
| Total Risk from All Sources (1990–ED– 1 Year) | | | 2.87E–06 | 2.92E– |
| Total Risk from All Sources (1991–ED– 1 Year) | | | 3.05E–06 | 1.75E–02 |
| Total Risk from All Sources (1992–ED– 1 Year) | | | 2.35E–06 | 0.00E+00 |
| Total Risk from All Sources (1993–ED– 1 Year) | | | 3.34E–06 | 1.75E–02 |
| Total Risk from All Sources (1993–ED– 30 Year) | | | 8.00E–05 | 1.75E–02 |
| **DERMAL CHILD** | | | | |
| Total Risk from All Sources (1989–ED– 1 Year) | | | 9.04E–08 | 1.04E–01 |
| Total Risk from All Sources (1990–ED– 1 Year) | | | 9.77E–08 | 1.11E–01 |
| Total Risk from All Sources (1991–ED– 1 Year) | | | 1.03E–07 | 1.17E–01 |
| Total Risk from All Sources (1992–ED– 1 Year) | | | 7.80E–08 | 8.95E–02 |
| Total Risk from All Sources (1993–ED– 1 Year) | | | 1.12E–07 | 1.28E–01 |
| Total Risk from All Sources (1993–ED– 30 Year) | | | 6.73E–07 | 1.28E–01 |
| **TOTAL RISK*** | | | | |
| | 1989 (1 YEAR) | ADULT | 2.89E–06 | 1.87E–01 |
| | 1990 (1 YEAR) | ADULT | 3.06E–06 | 2.45E–01 |
| | 1991 (1 YEAR) | ADULT | 3.24E–06 | 2.38E–01 |
| | 1992 (1 YEAR) | ADULT | 2.49E–06 | 1.61E–01 |
| | 1993 (1 YEAR) | ADULT | 3.55E–06 | 2.57E–01 |
| | 1989 (1 YEAR) | CHILD | 4.71E–07 | 5.40E–01 |
| | 1990 (1 YEAR) | CHILD | 5.55E–07 | 6.14E–01 |
| | 1991 (1 YEAR) | CHILD | 5.62E–07 | 6.31E–01 |
| | 1992 (1 YEAR) | CHILD | 4.06E–07 | 4.66E |
| | 1993 (1 YEAR) | CHILD | 6.12E–07 | 6.88E |
| | 1993 (30 YEARS) | | 8.89E–05 | 9.45E–01 |

*Total Risk without Fluoride

CHESTER RISK PROJECT
TABLE 4–23
SURFACE WATER RISKS

| STATION | CHEMICAL OF CONCERN | CHILD HAZARD INDEX | ADULT HAZARD INDEX | CANCER RISK |
|---|---|---|---|---|
| VERMICULITE DUMP (DS) | Aluminum | 0.00015 | 0.000038 | N/A |
| | Chromium | 0.00038 | 0.00011 | N/A |
| | Barium | 0.00027 | 0.000068 | N/A |
| | Cadmium | 0.00051 | 0.00023 | N/A |
| | Nickel | 0.00013 | 0.00003 | N/A |
| | Manganese | 0.015 | 0.0038 | N/A |
| | Zinc | 0.00019 | 0.000056 | N/A |
| | Arsenic | 0.0025 | 0.00065 | 2.3E–07 |
| | Selenium | 0.00075 | 0.00019 | N/A |
| | Mercury | 0.0061 | 0.0023 | N/A |
| | TOTAL | 0.026 | 0.0075 | 2.3E–07 |
| VERMICULITE DUMP (US) | Aluminum | 0.00014 | 0.000035 | N/A |
| | Chromium | 0.00044 | 0.00012 | N/A |
| | Barium | 0.00025 | 0.000064 | N/A |
| | Cadmium | 0.00045 | 0.0002 | N/A |
| | Copper | 0.000098 | 0.000027 | N/A |
| | Nickel | 0.00013 | 0.000029 | N/A |
| | Manganese | 0.014 | 0.0036 | N/A |
| | Zinc | 0.00013 | 0.000037 | N/A |
| | Vanadium | 0.00035 | 0.000088 | N/A |
| | Arsenic | 0.0057 | 0.0015 | 5.2E–07 |
| | Selenium | 0.00072 | 0.00017 | N/A |
| | Mercury | 0.014 | 0.0052 | N/A |
| | TOTAL | 0.036 | 0.011 | 5.2E–07 |
| WQN0182 | Manganese | 0.6727 | 0.17 | N/A |
| | TOTAL | 0.67 | 0.17 | N/A |
| ONROE CHEMICAL | Arsenic | 0.014 | 0.0036 | 1.3E–06 |
| | TOTAL | 0.014 | 0.0036 | 1.3E–06 |
| DELAWARE COUNTY INCINERATOR LAND–FILL #1 | Arsenic | 0.044 | 0.011 | 4.0E–06 |
| | Beryllium | 0.0061 | 0.0032 | 3.5E–05 |
| | Manganese | 0.28 | 0.0703 | N/A |
| | TOTAL | 0.33 | 0.085 | 3.9E–05 |
| 422120 | Free cyanide | 0.0004 | 0.0001 | N/A |
| | Total cyanide | 0.00044 | 0.00011 | N/A |
| | Cadmium | 0.05 | 0.023 | N/A |
| | Chromium | 0.0038 | 0.0011 | N/A |
| | Copper | 0.00036 | 0.0001 | N/A |
| | Zinc | 0.000071 | 0.00002 | N/A |
| | TOTAL* | 0.055 | 0.024 | N/A |
| 422088 | Cadmium | 0.07 | 0.032 | N/A |
| | Chromium | 0.0055 | 0.0016 | N/A |
| | Copper | 0.00044 | 0.00012 | N/A |
| | Zinc | 0.00066 | 0.00019 | N/A |
| | Mercury | 0.0022 | 0.00079 | N/A |
| | TOTAL | 0.079 | 0.035 | N/A |
| WQN0172 | Chromium | 0.0002 | 0.00006 | N/A |
| | Copper | 0.00043 | 0.00012 | N/A |
| | Manganese | 0.0049 | 0.0012 | N/A |
| | Nickel | 0.00042 | 0.000095 | N/A |
| | Zinc | 0.000044 | 0.000013 | N/A |
| | Aluminum | 0.00007 | 0.000017 | N/A |
| | TOTAL | 0.0061 | 0.0015 | N/A |
| WQN0158 | Chromium | 0.00021 | 0.00006 | N/A |
| | Manganese | 0.0023 | 0.00058 | N/A |
| | Nickel | 0.00043 | 0.000095 | N/A |
| | Zinc | 0.0028 | 0.0006 | N/A |
| | Aluminum | 0.000065 | 0.000016 | N/A |
| | TOTAL | 0.0058 | 0.0014 | N/A |

*INCLUDES TOTAL, NOT FREE, CYANIDE

CHESTER RISK PROJECT
TABLE 4-24
SEDIMENT RISKS

| STATION | CHEMICAL OF CONCERN | CHILD HAZARD INDEX | ADULT HAZARD INDEX | CANCER RISK |
|---|---|---|---|---|
| MONROE CHEMICAL-POND SED | Antimony | 0.024 | 0.0025 | N/A |
| | Arsenic | 0.0013 | 0.00014 | 8.2E-08 |
| | Beryllium | 0.000015 | 0.000001 | 4.0E-08 |
| | Cadmium | 0.0087 | 0.0028 | N/A |
| | Chromium | 0.0022 | 0.00024 | N/A |
| | Silver | 0.0037 | 0.0004 | N/A |
| | TOTAL | 0.040 | 0.0061 | 1.2E-07 |
| MONROE CHEMICAL-US SED | Benzo[b]fluoranthene | N/A | N/A | 4.6E-09 |
| | Arsenic | 0.0185 | 0.002 | 1.2E-06 |
| | Beryllium | 0.000046 | 0.000004 | 1.2E-07 |
| | Vanadium | 0.0052 | 0.00056 | N/A |
| | TOTAL | 0.024 | 0.0026 | 1.3E-06 |
| MONROE CHEMICAL-DS SED | Arsenic | 0.0068 | 0.00073 | 4.4E-07 |
| | Antimony | 0.014 | 0.0015 | N/A |
| | Beryllium | 0.000035 | 0.000003 | 9.4E-08 |
| | Chromium | 0.012 | 0.0013 | N/A |
| | Manganese | 0.011 | 0.0012 | N/A |
| | Nickel | 0.0026 | 0.00028 | N/A |
| | Vanadium | 0.0032 | 0.00035 | N/A |
| | TOTAL | 0.050 | 0.0054 | 5.3E-07 |
| EAST 10TH STREET | Benz[a]anthracene | N/A | N/A | 1.3E-07 |
| | Benzo[b]fluoranthene | N/A | N/A | 2.0E-07 |
| | Benzo[a]pyrene | N/A | N/A | 7.8E-07 |
| | Indeno[1,2,3-c,d]pyrene | N/A | N/A | 8.0E-08 |
| | Dibenz[a,h]anthracene | N/A | N/A | 2.5E-07 |
| | TOTAL | N/A | N/A | 1.4E-06 |
| DELAWARE COUNTY INCINERATOR LAND-FILL #1 | Arsenic | 0.01 | 0.0011 | 6.6E-07 |
| | Beryllium | 0.00009 | 0.000009 | 2.4E-07 |
| | Cadmium | 0.0065 | 0.0021 | N/A |
| | Chromium | 0.0056 | 0.0006 | N/A |
| | Vanadium | 0.0024 | 0.00026 | N/A |
| | Benz[a]anthracene | N/A | N/A | 3.9E-08 |
| | Benzo[b]fluoranthene | N/A | N/A | 5.0E-08 |
| | Benzo[a]pyrene | N/A | N/A | 6.2E-07 |
| | Dibenz[a,h]anthracene | N/A | N/A | 5.3E-08 |
| | TOTAL | 0.025 | 0.0041 | 1.7E-06 |
| ABM WADE | Arsenic | 0.14 | 0.015 | 9.0E-06 |
| | TOTAL | 0.14 | 0.015 | 9.0E-06 |
| 422115 | Antimony | 0.0064 | 0.00068 | N/A |
| | TOTAL | 0.0064 | 0.00068 | N/A |

**CHESTER RISK PROJECT**
**TABLE 4-27**
**Delaware County, PA. TRI Facilities**
**Chronic Index and Residual Mass Ranking**

| Rank | Company Name | City | TRI Category | Chemical and Issue of Concern |
|---|---|---|---|---|
| 6 | Epsilon Prods. | Marcus Hook | Air fugitive, Air stack | Ethylene, Propylene: volume |
| 5 | Boeing Defense & Space Group | Ridley Park | Air stack | Volatiles mixture: volume |
| 4 | Foamex L.P. | Eddystone | Air fugitive | Dichloromethane: toxicity |
| 3 | Scott Paper | Chester | Air fugitive, Air stack | Chloroform: toxicity<br>Acids: volume, acute toxicity |
| 2 | Witco Corp. | Trainer | Air fugitive, Air stack | 2-Methoxyethanol: volume and toxicity |
| 1 | Sun Refining & Marketing | Marcus Hook | Air fugitive, Air stack | Ethylene Oxide: volume, toxicity<br>Benzene and MTBE: volume, toxicity |

This analysis does not represent relative risk. The rank provides a rough estimate of potential hazard for screening purposes and must be evaluated with the qualitative information contained in this report.

## CHES RISK PROJECT

## TABLE 4-28

**1992 TRI FOR REGION III**
**DELAWARE CO., PA**

| Chemical Name | Facility ID# | TRI TRANSFERS: POTW Transfers (lb/yr) | POTW Chronic Index | Offsite Transfers (lb/yr) | Offsite Chronic Index | TRI TOTALS: Total Releases and Transfers (lb/yr) | Total Chronic Index | Total Releases and Transfers Sums | Total Chronic Index Sums |
|---|---|---|---|---|---|---|---|---|---|
| TRICHLOROETHYLENE | 19013BNGHLINDUS | 0 | 0 | 15050 | 15864654 | 24600 | 24468370 | | |
| ACETONE | 19013BNGHLINDUS | 0 | 0 | 29000 | 5141683 | 81000 | 14361252 | | |
| METHYL ISOBUTYL KETONE | 19013BNGHLINDUS | 0 | 0 | 2550 | 904227 | 43800 | 15531429 | 261750 | 61820924 |
| SULFURIC ACID | 19013SCTFM1600E | 0 | 0 | 0 | 0 | 0 | 0 | | |
| TOLUENEDIISOCYANATE (MIXED ISC | 19013SCTFM1600E | 0 | 0 | 750 | 0 | 806 | 0 | | |
| DICHLOROMETHANE | 19013SCTFM1600E | 0 | 0 | 0 | 0 | 33642 | 39795173 | 34448 | 39795173 |
| HYDROCHLORIC ACID | 19013SCTTPFRONT | 0 | 0 | 0 | 0 | 53000 | 0 | | |
| SULFURIC ACID | 19013SCTTPFRONT | 0 | 0 | 770 | 0 | 116770 | 0 | | |
| BUTYL BENZYL PHTHALATE | 19013SCTTPFRONT | 10000 | 896497 | 10 | 896 | 76310 | 6764859 | | |
| CHLOROFORM | 19013SCTTPFRONT | 500 | 1248808 | 0 | 0 | 14000 | 36964724 | 254880 | 43729583 |
| SULFURIC ACID | 19013WTCCR3300W | 4 | 0 | 0 | 0 | 4 | 0 | | |
| METHANOL | 19013WTCCR3300W | 6700 | 237581 | 0 | 0 | 263006 | 9328699 | | |
| 2-METHOXYETHANOL | 19013WTCCR3300W | 29120 | 356726419 | 0 | 0 | 516770 | 9056081683 | 773869 | 9065410692 |
| CHLORINE | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 0 | 0 | | |
| CRESOL (MIXED ISOMERS) | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 0 | 0 | | |
| ETHYLENE GLYCOL | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 0 | 0 | | |
| PHENOL | 19061SNRFNGREEN | 44000 | 1300196 | 0 | 0 | 44000 | 1300196 | | |
| SULFURIC ACID | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1,3-BUTADIENE | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 120 | 0 | | |
| CYCLOHEXANE | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 2550 | 0 | | |
| 1,2,4-TRIMETHYLBENZENE | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 4998 | 0 | | |
| AMMONIA | 19061SNRFNGREEN | 320000 | 0 | 0 | 0 | 329300 | 0 | | |
| PROPYLENE | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 45000 | 0 | | |
| ETHYLENE | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 46000 | 0 | | |
| ZINC COMPOUNDS | 19061SNRFNGREEN | 7300 | 431429 | 730 | 43143 | 8300 | 490529 | | |
| METHANOL | 19061SNRFNGREEN | 76000 | 2694951 | 0 | 0 | 82900 | 2936078 | | |
| XYLENE (MIXED ISOMERS) | 19061SNRFNGREEN | 29000 | 257084 | 0 | 0 | 58700 | 520239 | | |
| ETHYLBENZENE | 19061SNRFNGREEN | 2900 | 496438 | 0 | 0 | 6020 | 1067342 | | |
| TOLUENE | 19061SNRFNGREEN | 63000 | 5584932 | 0 | 0 | 101800 | 9024540 | | |
| CHROMIUM COMPOUNDS | 19061SNRFNGREEN | 9400 | 33332290 | 490 | 1737534 | 11190 | 39679609 | | |
| ANTIMONY COMPOUNDS | 19061SNRFNGREEN | 460 | 20389432 | 10890 | 482697652 | 11750 | 520817025 | | |
| METHYL TERT-BUTYL ETHER | 19061SNRFNGREEN | 6900 | 24467319 | 0 | 0 | 21100 | 74820352 | | |
| BENZENE | 19061SNRFNGREEN | 29000 | 149108751 | 0 | 0 | 83900 | 431387041 | | |
| ETHYLENE OXIDE | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 110400 | 16770950232 | 968926 | 17853002183 |

# *CHESTER RISK PROJECT*

## *TABLE 4-28*

**1992 TRI FOR REGION III**
**DELAWARE CO., PA**

| Chemical Name | Facility ID# | TRI TRANSFERS: POTW Transfers (lb/yr) | POTW Chronic Index | Offsite Transfers (lb/yr) | Offsite Chronic Index | TRI TOTALS: Total Releases and Transfers (lb/yr) | Total Chronic Index | Total Releases and Transfers Sums | Total Chronic Index Sums |
|---|---|---|---|---|---|---|---|---|---|
| XYLENE (MIXED ISOMERS) | 19014ZNTHP200CO | 0 | 0 | 500 | 4432 | 26250 | 232705 | | |
| TOLUENE | 19014ZNTHP200CO | 0 | 0 | 500 | 44325 | 20750 | 1839491 | 47000 | 2072197 |
| ETHYLENE GLYCOL | 19032MZRCH1830C | 0 | 0 | 2000 | 17730 | 2000 | 17730 | | |
| DIETHANOLAMINE | 19032MZRCH1830C | 7 | 0 | 727 | 0 | 791 | 0 | | |
| DIETHYL SULFATE | 19032MZRCH1830C | 0 | 0 | 0 | 0 | 234 | 0 | | |
| GLYCOL ETHERS | 19032MZRCH1830C | 6779 | 120191272 | 6779 | 120191272 | 13560 | 240772803 | | |
| CHLOROMETHANE | 19032MZRCH1830C | 0 | 0 | 0 | 0 | 583 | 456876 | | |
| BENZYL CHLORIDE | 19032MZRCH1830C | 0 | 0 | 0 | 0 | 211 | 4261020 | 17399 | 245508229 |
| DECABROMODIPHENYL OXIDE | 19013TRSCQ800WF | 0 | 0 | 3000 | 5318982 | 6000 | 10637965 | 6000 | 10637965 |
| XYLENE (MIXED ISOMERS) | 19050JLNBS300EB | 0 | 0 | 4000 | 35460 | 26298 | 232947 | | |
| TOLUENE | 19050JLNBS300EB | 0 | 0 | 12322 | 1092342 | 98864 | 8764265 | 125130 | 8997112 |
| HYDROCHLORIC ACID | 19032THBLL1640D | 0 | 0 | 0 | 0 | 750 | 0 | | |
| HYDROGEN FLUORIDE | 19032THBLL1640D | 0 | 0 | 0 | 0 | 750 | 0 | | |
| PHOSPHORIC ACID | 19032THBLL1640D | 0 | 0 | 0 | 0 | 750 | 0 | | |
| GLYCOL ETHERS | 19032THBLL1640D | 250 | 4432485 | 0 | 0 | 1800 | 17729941 | 3250 | 17729941 |
| 1,1,1-TRICHLOROETHANE | 19016TLDYN4THTO | 0 | 0 | 0 | 0 | 111255 | 21917162 | 111255 | 21917162 |
| DIETHANOLAMINE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 0 | 0 | | |
| NICKEL | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 0 | 0 | | |
| PHOSPHORIC ACID | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 0 | 0 | | |
| SULFURIC ACID | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1,2,4-TRIMETHYLBENZENE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 5 | 0 | | |
| CYCLOHEXANE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 415 | 0 | | |
| HYDROGEN FLUORIDE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 645 | 0 | | |
| ETHYLENE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 1267 | 0 | | |
| PROPYLENE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 4483 | 0 | | |
| AMMONIA | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 84531 | 0 | | |
| METHANOL | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 290 | 10283 | | |
| XYLENE (MIXED ISOMERS) | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 4899 | 43341 | | |
| ETHYLBENZENE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 593 | 105139 | | |
| TETRACHLOROETHYLENE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 45 | 291374 | | |
| TOLUENE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 4899 | 433408 | | |
| 1,2-DICHLOROETHANE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 133 | 1437722 | | |
| NAPHTHALENE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 668 | 2960900 | | |
| METHYL TERT-BUTYL ETHER | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 2982 | 10574137 | | |
| BENZENE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 3058 | 15723261 | 108893 | 31579585 |
| SULFURIC ACID | 19013BNGHLINDUS | 0 | 0 | 750 | 0 | 1800 | 0 | | |
| METHYL ETHYL KETONE | 19013BNGHLINDUS | 0 | 0 | 16550 | 489051 | 40800 | 1205636 | | |
| TOLUENE | 19013BNGHLINDUS | 0 | 0 | 12550 | 1112554 | 70550 | 6254237 | | |

## CHES[illegible]RISK PROJECT

## TABLE 4-28

1992 TRI FOR REGION III
DELAWARE CO., PA

| Chemical Name | Facility ID# | TRI TRANSFERS: POTW Transfers (lb/yr) | POTW Chronic Index | Offsite Transfers (lb/yr) | Offsite Chronic Index | TRI TOTALS: Total Releases and Transfers (lb/yr) | Total Chronic Index | Total Releases and Transfers Sums | Total Chronic Index Sums |
|---|---|---|---|---|---|---|---|---|---|
| CHROMIUM | 19013PNNSY100BE | 0 | 0 | 18150 | 0 | 18150 | 0 | | |
| NICKEL | 19013PNNSY100BE | 0 | 0 | 11550 | 10239041 | 11550 | 10239041 | 29700 | 10239041 |
| SULFURIC ACID | 19013NRTHM1200W | 0 | 0 | 0 | 0 | 0 | 0 | | |
| AMMONIA | 19013NRTHM1200W | 0 | 0 | 0 | 0 | 1700 | 0 | 1700 | 0 |
| PHOSPHORIC ACID | 19331CNCRDCONCH | 0 | 0 | 0 | 0 | 0 | 0 | | |
| AMMONIA | 19331CNCRDCONCH | 0 | 0 | 0 | 0 | 5045 | 0 | 5045 | 0 |
| ETHYLENE | 19061PSLNPBLUEB | 0 | 0 | 0 | 0 | 9100 | 0 | | |
| PROPYLENE | 19061PSLNPBLUEB | 0 | 0 | 0 | 0 | 61100 | 0 | 70200 | 0 |
| CHROMIUM COMPOUNDS | 19013THPQCFRONT | 0 | 0 | 147536 | 523139648 | 147536 | 523157378 | 147535 | 523157378 |
| FORMALDEHYDE | 19050HYDRL520CO | 0 | 0 | 0 | 0 | 619 | 54874 | 619 | 54874 |
| NAPHTHALENE | 19061CNGLMRIDGE | 0 | 0 | 7400 | 32800391 | 7410 | 32844716 | | |
| BUTYL BENZYL PHTHALATE | 19061CNGLMRIDGE | 5 | 443 | 52100 | 4618650 | 52610 | 4663861 | 60020 | 37508577 |
| FREON 113 | 19014MCGND9CROZ | 0 | 0 | 0 | 0 | 750 | 443 | | |
| 1,1,1-TRICHLOROETHANE | 19014MCGND9CROZ | 0 | 0 | 6100 | 1201696 | 7100 | 1398695 | 7850 | 1399139 |
| COPPER COMPOUNDS | 19013HRCST651E9 | 0 | 0 | 0 | 0 | 103 | 365237 | 103 | 365237 |
| 1,1,1-TRICHLOROETHANE | 19015RBNDS2RACE | 0 | 0 | 0 | 0 | 1100 | 216699 | | |
| ACETONE | 19015RBNDS2RACE | 0 | 0 | 19688 | 3490671 | 21388 | 3792080 | 22488 | 4008779 |
| XYLENE (MIXED ISOMERS) | 19023SNTRY237MI | 0 | 0 | 15435 | 136831 | 16535 | 173177 | | |
| TOLUENE | 19023SNTRY237MI | 0 | 0 | 8597 | 762122 | 14697 | 1302885 | 34232 | 1476062 |
| METHANOL | 19014CSTMC8CROZ | 0 | 0 | 0 | 0 | 16528 | 586081 | 16528 | 586081 |
| DIBUTYL PHTHALATE | 19029SSCHM48POW | 0 | 0 | 600 | 106380 | 600 | 106380 | | |
| METHYL METHACRYLATE | 19029SSCHM48POW | 0 | 0 | 3200 | 709198 | 6165 | 1366314 | 6765 | 1472693 |
| TOLUENE | 19014NTRNT11CRO | 0 | 0 | 4201 | 372417 | 15779 | 1398804 | 15779 | 1398804 |
| 1,1,1-TRICHLOROETHANE | 19018LTTNSMARPL | 0 | 0 | 8050 | 1595845 | 13900 | 2738291 | 13900 | 2738291 |
| NICKEL | 19018BCHNNPENNJ | 5 | 4432 | 0 | 0 | 5 | 4432 | | |
| TOLUENE | 19018BCHNNPENNJ | 0 | 0 | 0 | 0 | 1002 | 88827 | | |
| 1,1,1-TRICHLOROETHANE | 19018BCHNNPENNJ | 0 | 0 | 3136 | 617790 | 11400 | 2245793 | 12407 | 2339052 |
| N-BUTYL ALCOHOL | 19014ZNTHP200CO | 0 | 0 | 0 | 0 | 0 | 0 | | |

# *CHESTER RISK PROJECT*

## *TABLE 4-28*

**1992 TRI FOR REGION III**
**DELAWARE CO., PA**

*TRI RELEASES:*

| Chemical Name | Facility ID# | Air Nonpoint Releases (lb/yr) | Air NonPoint Chronic Index | Air Point Releases (lb/yr) | Air Point Chronic Index | Water Releases (lb/yr) | Water Chronic Index | Land Releases (lb/yr) | Land Chronic Index | Onsite Total Releases (lb/yr) | Onsite Total Chronic Index | Onsite Total Releases Sums | Onsite Total Chronic Index Sums |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TRICHLOROETHYLENE | 19013BNGHLINDUS | 250 | 246662 | 8400 | 8355053 | 0 | 0 | 9 | 0 | 8650 | 8603715 | | |
| ACETONE | 19013BNGHLINDUS | 12000 | 2127593 | 40000 | 7091977 | 0 | 0 | 0 | 0 | 52000 | 9219569 | | |
| METHYL ISOBUTYL KETONE | 19013BNGHLINDUS | 250 | 88650 | 41000 | 14538552 | 0 | 0 | 0 | 0 | 41250 | 14627202 | 184400 | 38308755 |
| SULFURIC ACID | 19013SCTFM1500E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| TOLUENEDIISOCYANATE (MIXED ISC | 19013SCTFM1500E | 5 | 0 | 151 | 0 | 0 | 0 | 0 | 0 | 156 | 0 | | |
| DICHLOROMETHANE | 19013SCTFM1500E | 33532 | 39783309 | 10 | 11864 | 0 | 0 | 0 | 0 | 33542 | 39795173 | 33698 | 39795173 |
| HYDROCHLORIC ACID | 19013SCTTPFRONT | 0 | 0 | 53000 | 0 | 0 | 0 | 0 | 0 | 53000 | 0 | | |
| SULFURIC ACID | 19013SCTTPFRONT | 0 | 0 | 110000 | 0 | 0 | 0 | 0 | 0 | 110000 | 0 | | |
| BUTYL BENZYL PHTHALATE | 19013SCTTPFRONT | 7300 | 647143 | 59000 | 5230333 | 0 | 0 | 0 | 0 | 66300 | 5877476 | | |
| CHLOROFORM | 19013SCTTPFRONT | 6800 | 16983792 | 7500 | 18732123 | 0 | 0 | 0 | 0 | 14300 | 35715915 | 243600 | 41593391 |
| SULFURIC ACID | 19013WTCCR3300W | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| METHANOL | 19013WTCCR3300W | 207589 | 7361436 | 48787 | 1729981 | 0 | 0 | 0 | 0 | 256386 | 9091417 | | |
| 2-METHOXYETHANOL | 19013WTCCR3300W | 352094 | 6242605949 | 138565 | 2456749315 | 0 | 0 | 0 | 0 | 490659 | 8699355264 | 747045 | 8708446682 |
| CHLORINE | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| CRESOL (MIXED ISOMERS) | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| ETHYLENE GLYCOL | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| PHENOL | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| SULFURIC ACID | 19061SNRFNGREEN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1,3-BUTADIENE | 19061SNRFNGREEN | 120 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 120 | 0 | | |
| CYCLOHEXANE | 19061SNRFNGREEN | 1600 | 0 | 950 | 0 | 0 | 0 | 0 | 0 | 2550 | 0 | | |
| 1,2,4-TRIMETHYLBENZENE | 19061SNRFNGREEN | 4900 | 0 | 96 | 0 | 0 | 0 | 0 | 0 | 4996 | 0 | | |
| AMMONIA | 19061SNRFNGREEN | 9300 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9300 | 0 | | |
| PROPYLENE | 19061SNRFNGREEN | 33000 | 0 | 12000 | 0 | 0 | 0 | 0 | 0 | 45000 | 0 | | |
| ETHYLENE | 19061SNRFNGREEN | 46000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46000 | 0 | | |
| ZINC COMPOUNDS | 19061SNRFNGREEN | 0 | 0 | 270 | 15957 | 0 | 0 | 0 | 0 | 270 | 15957 | | |
| METHANOL | 19061SNRFNGREEN | 5700 | 202121 | 1100 | 39006 | 0 | 0 | 0 | 0 | 6800 | 241127 | | |
| XYLENE (MIXED ISOMERS) | 19061SNRFNGREEN | 29000 | 257084 | 1700 | 15070 | 0 | 0 | 0 | 0 | 30700 | 272155 | | |
| ETHYLBENZENE | 19061SNRFNGREEN | 3000 | 531898 | 220 | 39006 | 0 | 0 | 0 | 0 | 3220 | 570904 | | |
| TOLUENE | 19061SNRFNGREEN | 31000 | 2748141 | 7900 | 691468 | 0 | 0 | 0 | 0 | 38900 | 3439609 | | |
| CHROMIUM COMPOUNDS | 19061SNRFNGREEN | 0 | 0 | 1300 | 4609785 | 0 | 0 | 0 | 0 | 1300 | 4609785 | | |
| ANTIMONY COMPOUNDS | 19061SNRFNGREEN | 0 | 0 | 400 | 17729941 | 0 | 0 | 0 | 0 | 400 | 17729941 | | |
| METHYL TERT-BUTYL ETHER | 19061SNRFNGREEN | 4800 | 17020744 | 9400 | 33332290 | 0 | 0 | 0 | 0 | 14200 | 50353033 | | |
| BENZENE | 19061SNRFNGREEN | 51000 | 262225734 | 3900 | 20052556 | 0 | 0 | 0 | 0 | 54900 | 282278290 | | |
| ETHYLENE OXIDE | 19061SNRFNGREEN | 110000 | 16710185920 | 400 | 60764312 | 0 | 0 | 0 | 0 | 110400 | 16770950232 | 368956 | 17130461033 |

## CHES[illegible]RISK PROJECT

## TABLE 4-28

**1992 TRI FOR REGION III**
**DELAWARE CO., PA**

*TRI RELEASES:*

| Chemical Name | Facility ID# | Air Nonpoint Releases (lb/yr) | Air NonPoint Chronic Index | Air Point Releases (lb/yr) | Air Point Chronic Index | Water Releases (lb/yr) | Water Chronic Index | Land Releases (lb/yr) | Land Chronic Index | Onsite Total Releases (lb/yr) | Onsite Total Chronic Index | Onsite Total Releases Sums | Onsite Total Chronic Index Sums |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| XYLENE (MIXED ISOMERS) | 19014ZNTHP200CO | 250 | 2216 | 25500 | 226057 | 0 | 0 | 0 | 0 | 25750 | 228273 | | |
| TOLUENE | 19014ZNTHP200CO | 250 | 22162 | 20000 | 1772994 | 0 | 0 | 0 | 0 | 20250 | 1795157 | 46000 | 2023430 |
| ETHYLENE GLYCOL | 19032MZRCH1830C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| DIETHANOLAMINE | 19032MZRCH1830C | 57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 57 | 0 | | |
| DIETHYL SULFATE | 19032MZRCH1830C | 234 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 234 | 0 | | |
| GLYCOL ETHERS | 19032MZRCH1830C | 22 | 399059 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 399059 | | |
| CHLOROMETHANE | 19032MZRCH1830C | 5 | 3018 | 578 | 453957 | 0 | 0 | 0 | 0 | 583 | 456876 | | |
| BENZYL CHLORIDE | 19032MZRCH1830C | 211 | 4261020 | 0 | 0 | 0 | 0 | 0 | 0 | 211 | 4261020 | 1107 | 5107955 |
| DECABROMODIPHENYL OXIDE | 19013TRSCQ800WF | 3000 | 5319082 | 0 | 0 | 0 | 0 | 0 | 0 | 3000 | 5319082 | 3000 | 5319082 |
| XYLENE (MIXED ISOMERS) | 19050JLNBS300EB | 16779 | 166475 | 3467 | 30912 | 0 | 0 | 0 | 0 | 22296 | 197387 | | |
| TOLUENE | 19050JLNBS300EB | 72967 | 6470276 | 13556 | 1201647 | 0 | 0 | 0 | 0 | 86542 | 7671923 | 108808 | 7869310 |
| HYDROCHLORIC ACID | 19032THBLL1640D | 250 | 0 | 250 | 0 | 0 | 0 | 250 | 0 | 750 | 0 | | |
| HYDROGEN FLUORIDE | 19032THBLL1640D | 250 | 0 | 250 | 0 | 0 | 0 | 250 | 0 | 750 | 0 | | |
| PHOSPHORIC ACID | 19032THBLL1640D | 250 | 0 | 250 | 0 | 0 | 0 | 250 | 0 | 750 | 0 | | |
| GLYCOL ETHERS | 19032THBLL1640D | 250 | 4432485 | 250 | 4432485 | 0 | 0 | 250 | 4432485 | 750 | 13297456 | 3000 | 13297456 |
| 1,1,1-TRICHLOROETHANE | 19016TLDYN4THTO | 22251 | 4383432 | 88004 | 17533730 | 0 | 0 | 0 | 0 | 111255 | 21917162 | 111255 | 21917162 |
| DIETHANOLAMINE | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| NICKEL | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| PHOSPHORIC ACID | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| SULFURIC ACID | 19061BPLCMPOSTR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1,2,4-TRIMETHYLBENZENE | 19061BPLCMPOSTR | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | | |
| CYCLOHEXANE | 19061BPLCMPOSTR | 382 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 415 | 0 | | |
| HYDROGEN FLUORIDE | 19061BPLCMPOSTR | 645 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 645 | 0 | | |
| ETHYLENE | 19061BPLCMPOSTR | 114 | 0 | 1153 | 0 | 0 | 0 | 0 | 0 | 1267 | 0 | | |
| PROPYLENE | 19061BPLCMPOSTR | 1187 | 0 | 3296 | 0 | 0 | 0 | 0 | 0 | 4483 | 0 | | |
| AMMONIA | 19061BPLCMPOSTR | 79 | 0 | 17480 | 0 | 66972 | 0 | 0 | 0 | 84531 | 0 | | |
| METHANOL | 19061BPLCMPOSTR | 0 | 0 | 290 | 10293 | 0 | 0 | 0 | 0 | 290 | 10293 | | |
| XYLENE (MIXED ISOMERS) | 19061BPLCMPOSTR | 4406 | 39059 | 483 | 4282 | 0 | 0 | 0 | 0 | 4889 | 43341 | | |
| ETHYLBENZENE | 19061BPLCMPOSTR | 581 | 103011 | 12 | 2128 | 0 | 0 | 0 | 0 | 593 | 105139 | | |
| TETRACHLOROETHYLENE | 19061BPLCMPOSTR | 45 | 291374 | 0 | 0 | 0 | 0 | 0 | 0 | 45 | 291374 | | |
| TOLUENE | 19061BPLCMPOSTR | 4406 | 390591 | 483 | 42818 | 0 | 0 | 0 | 0 | 4889 | 433408 | | |
| 1,2-DICHLOROETHANE | 19061BPLCMPOSTR | 133 | 1437722 | 0 | 0 | 0 | 0 | 0 | 0 | 133 | 1437722 | | |
| NAPHTHALENE | 19061BPLCMPOSTR | 668 | 2960900 | 0 | 0 | 0 | 0 | 0 | 0 | 668 | 2960900 | | |
| METHYL TERT-BUTYL ETHER | 19061BPLCMPOSTR | 36 | 127656 | 2946 | 10446481 | 0 | 0 | 0 | 0 | 2982 | 10574137 | | |
| BENZENE | 19061BPLCMPOSTR | 2644 | 13504605 | 414 | 2120656 | 0 | 0 | 0 | 0 | 3058 | 15725261 | 108893 | 31579565 |
| SULFURIC ACID | 19013BNGHLINDUS | 0 | 0 | 250 | 0 | 0 | 0 | 0 | 0 | 250 | 0 | | |
| METHYL ETHYL KETONE | 19013BNGHLINDUS | 250 | 7387 | 24000 | 709198 | 0 | 0 | 0 | 0 | 24250 | 716585 | | |
| TOLUENE | 19013BNGHLINDUS | 1000 | 38650 | 57000 | 5053033 | 0 | 0 | 0 | 0 | 58000 | 5141683 | | |

# *CHESTER RISK PROJECT*

## *TABLE 4-28*

**1992 TRI FOR REGION III**
**DELAWARE CO., PA**

*TRI RELEASES:*

| Chemical Name | Facility IDs | Air Nonpoint Releases (lb/yr) | Air NonPoint Chronic Index | Air Point Releases (lb/yr) | Air Point Chronic Index | Water Releases (lb/yr) | Water Chronic Index | Land Releases (lb/yr) | Land Chronic Index | Onsite Total Releases (lb/yr) | Onsite Total Chronic Index | Onsite Total Releases Sums | Onsite Total Chronic Index Sums |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CHROMIUM | 19013PNNSY100BE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| NICKEL | 19013PNNSY100BE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SULFURIC ACID | 19013NRTHM1200W | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| AMMONIA | 19013NRTHM1200W | 0 | 0 | 1700 | 0 | 0 | 0 | 0 | 0 | 1700 | 0 | 1700 | 0 |
| PHOSPHORIC ACID | 19331CNCRDCONCH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| AMMONIA | 19331CNCRDCONCH | 5045 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5045 | 0 | 5045 | 0 |
| ETHYLENE | 19061PSLNPBLUEB | 6700 | 0 | 2400 | 0 | 0 | 0 | 0 | 0 | 9100 | 0 | | |
| PROPYLENE | 19061PSLNPBLUEB | 53000 | 0 | 8100 | 0 | 0 | 0 | 0 | 0 | 61100 | 0 | 70200 | 0 |
| CHROMIUM COMPOUNDS | 19013THPQCFRONT | 0 | 0 | 5 | 17730 | 0 | 0 | 0 | 0 | 5 | 17730 | 5 | 17730 |
| FORMALDEHYDE | 19050HYDRL520CO | 78 | 6915 | 541 | 47959 | 0 | 0 | 0 | 0 | 619 | 54874 | 619 | 54874 |
| NAPHTHALENE | 19061CNGLMRIDGE | 5 | 22162 | 5 | 22162 | 0 | 0 | 0 | 0 | 10 | 44325 | | |
| BUTYL BENZYL PHTHALATE | 19061CNGLMRIDGE | 250 | 22162 | 250 | 22162 | 5 | 443 | 0 | 0 | 505 | 44768 | 515 | 89093 |
| FREON 113 | 19014MCGND9CROZ | 750 | 443 | 0 | 0 | 0 | 0 | 0 | 0 | 750 | 443 | | |
| 1,1,1-TRICHLOROETHANE | 19014MCGND9CROZ | 750 | 147750 | 250 | 49250 | 0 | 0 | 0 | 0 | 1000 | 196999 | 1750 | 197443 |
| COPPER COMPOUNDS | 19013HRCST651E9 | 0 | 0 | 103 | 365237 | 0 | 0 | 0 | 0 | 103 | 365237 | 103 | 365237 |
| 1,1,1-TRICHLOROETHANE | 19015RBNDS2RACE | 1100 | 216699 | 0 | 0 | 0 | 0 | 0 | 0 | 1100 | 216699 | | |
| ACETONE | 19015RBNDS2RACE | 1700 | 301409 | 0 | 0 | 0 | 0 | 0 | 0 | 1700 | 301409 | 2800 | 518108 |
| XYLENE (MIXED ISOMERS) | 19023SNTRY237MI | 0 | 0 | 4100 | 36346 | 0 | 0 | 0 | 0 | 4100 | 36346 | | |
| TOLUENE | 19023SNTRY237MI | 0 | 0 | 6100 | 540763 | 0 | 0 | 0 | 0 | 6100 | 540763 | 10200 | 577110 |
| METHANOL | 19014CSTMC8CROZ | 934 | 29574 | 15694 | 556507 | 0 | 0 | 0 | 0 | 16528 | 586081 | 16528 | 586081 |
| DIBUTYL PHTHALATE | 19029SSCHM48POW | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| METHYL METHACRYLATE | 19029SSCHM48POW | 2960 | 656008 | 5 | 1108 | 0 | 0 | 0 | 0 | 2965 | 657116 | 2965 | 657116 |
| TOLUENE | 19014NTRNT11CRO | 11578 | 1026386 | 0 | 0 | 0 | 0 | 0 | 0 | 11578 | 1026386 | 11578 | 1026386 |
| 1,1,1-TRICHLOROETHANE | 19018LTTNSMARPL | 2350 | 462948 | 3500 | 689499 | 0 | 0 | 0 | 0 | 5850 | 1152446 | 5850 | 1152446 |
| NICKEL | 19018BCHNNPENNJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| TOLUENE | 19018BCHNNPENNJ | 0 | 0 | 1002 | 88827 | 0 | 0 | 0 | 0 | 1002 | 88827 | | |
| 1,1,1-TRICHLOROETHANE | 19018BCHNNPENNJ | 0 | 0 | 8264 | 1628003 | 0 | 0 | 0 | 0 | 8264 | 1628003 | 9266 | 1716830 |
| N-BUTYL ALCOHOL | 19014ZNTHP200CO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |

# TABLE 4-28

1992 TRI FOR REGION III
DELAWARE CO., PA

TOXICITY DATA:

| Chemical Name | Facility ID# | Reference Dose (RfD) | Confidence Statement | | Reference Dose Status | Cancer Potency (CPF) | Weight of Evidence | RfD Index Dose | CPF Index Dose |
|---|---|---|---|---|---|---|---|---|---|
| TRICHLOROETHYLENE | 19013BNGHLINDUS | 0 | | | | 0.011 | c-b2 | 0 | 1.2477725 |
| ACETONE | 19013BNGHLINDUS | 0.1 | low | Iris | | 0 | | 7 | 0 |
| METHYL ISOBUTYL KETONE | 19013BNGHLINDUS | 0.05 | | HEAST | | 0 | | 3.5 | 0 |
| SULFURIC ACID | 19013SCTFM1500E | 0 | | | | 0 | | 0 | 0 |
| TOLUENEDIISOCYANATE (MIXED ISC | 19013SCTFM1500E | 0 | | | | 0 | | 0 | 0 |
| DICHLOROMETHANE | 19013SCTFM1500E | 0.06 | medium | Iris | | 0.0075 | B2 | 4.2 | 1.3930355 |
| HYDROCHLORIC ACID | 19013SCTTPFRONT | 0 | | | | 0 | | 0 | 0 |
| SULFURIC ACID | 19013SCTTPFRONT | 0 | | | | 0 | | 0 | 0 |
| BUTYL BENZYL PHTHALATE | 19013SCTTPFRONT | 0.2 | low | Iris | | 0 | C | 14 | 0 |
| CHLOROFORM | 19013SCTTPFRONT | 0.01 | medium | Iris | | 0.0061 | B2 | 0.7 | 1.7127486 |
| SULFURIC ACID | 19013WTCCR3300W | 0 | | | | 0 | | 0 | 0 |
| METHANOL | 19013WTCCR3300W | 0.5 | medium | Iris | | 0 | | 35 | 0 |
| 2-METHOXYETHANOL | 19013WTCCR3300W | 0.001 | na | HEAST | | 0 | | 0.07 | 0 |
| CHLORINE | 19061SNRFNGREEN | 0 | | | | 0 | | 0 | 0 |
| CRESOL (MIXED ISOMERS) | 19061SNRFNGREEN | 0 | | | | 0 | | 0 | 0 |
| ETHYLENE GLYCOL | 19061SNRFNGREEN | 2 | high | Iris | | 0 | | 140 | 0 |
| PHENOL | 19061SNRFNGREEN | 0.6 | low | Iris | | 0 | | 42 | 0 |
| SULFURIC ACID | 19061SNRFNGREEN | 0 | | | | 0 | | 0 | 0 |
| 1,3-BUTADIENE | 19061SNRFNGREEN | 0 | | | | 0 | | 0 | 0 |
| CYCLOHEXANE | 19061SNRFNGREEN | 0 | | | | 0 | | 0 | 0 |
| 1,2,4-TRIMETHYLBENZENE | 19061SNRFNGREEN | 0 | | | | 0 | | 0 | 0 |
| AMMONIA | 19061SNRFNGREEN | 0 | | | | 0 | | 0 | 0 |
| PROPYLENE | 19061SNRFNGREEN | 0 | | | | 0 | | 0 | 0 |
| ETHYLENE | 19061SNRFNGREEN | 0 | | | | 0 | | 0 | 0 |
| ZINC COMPOUNDS | 19061SNRFNGREEN | 0.3 | medium | Iris | | 0 | | 21 | 0 |
| METHANOL | 19061SNRFNGREEN | 0.5 | medium | Iris | | 0 | | 35 | 0 |
| XYLENE (MIXED ISOMERS) | 19061SNRFNGREEN | 2 | medium | Iris | | 0 | | 140 | 0 |
| ETHYLBENZENE | 19061SNRFNGREEN | 0.1 | low | Iris | | 0 | | 7 | 0 |
| TOLUENE | 19061SNRFNGREEN | 0.2 | medium | Iris | | 0 | | 14 | 0 |
| CHROMIUM COMPOUNDS | 19061SNRFNGREEN | 0.005 | low | Iris | | 0 | | 0.35 | 0 |
| ANTIMONY COMPOUNDS | 19061SNRFNGREEN | 0.0004 | low | Iris | | 0 | | 0.028 | 0 |
| METHYL TERT-BUTYL ETHER | 19061SNRFNGREEN | 0.005 | na | | | 0 | | 0.35 | 0 |
| BENZENE | 19061SNRFNGREEN | 0 | | | | 0.029 | A | 0 | 0.2413794 |
| ETHYLENE OXIDE | 19061SNRFNGREEN | 0 | | | | 1.02 | B1 | 0 | 0.0081699 |

# *CHESTER RISK PROJECT*

## *TABLE 4-28*

**1992 TRI FOR REGION III**
**DELAWARE CO., PA**

***TOXICITY DATA:***

| Chemical Name | Facility ID# | Reference Dose (RfD) | Confidence Statement | Reference Dose Status | Cancer Potency (CPF) | Weight of Evidence | RfD Index Dose | CPF Index Dose |
|---|---|---|---|---|---|---|---|---|
| XYLENE (MIXED ISOMERS) | 19014ZNTHP200CO | 2 | medium | iris | 0 | | 140 | 0 |
| TOLUENE | 19014ZNTHP200CO | 0.2 | medium | iris | 0 | | 14 | 0 |
| ETHYLENE GLYCOL | 19032MZRCH1830C | 2 | high | iris | 0 | | 140 | 0 |
| DIETHANOLAMINE | 19032MZRCH1830C | 0 | | | 0 | | 0 | 0 |
| DIETHYL SULFATE | 19032MZRCH1830C | 0 | | | 0 | | 0 | 0 |
| GLYCOL ETHERS | 19032MZRCH1830C | 0.001 | na | HEAST | 0 | | 0.07 | 0 |
| CHLOROMETHANE | 19032MZRCH1830C | 0 | | | 0.013 | C | 0 | 1.5837112 |
| BENZYL CHLORIDE | 19032MZRCH1830C | 0 | | | 0.17 | B2 | 0 | 0.0614574 |
| DECABROMODIPHENYL OXIDE | 19013TRSCQ800WF | 0.01 | low | iris | 0 | | 0.7 | 0 |
| XYLENE (MIXED ISOMERS) | 19050JLNBS300EB | 2 | medium | iris | 0 | | 140 | 0 |
| TOLUENE | 19050JLNBS300EB | 0.2 | medium | iris | 0 | | 14 | 0 |
| HYDROCHLORIC ACID | 19032THBLL1640D | 0 | | | 0 | | 0 | 0 |
| HYDROGEN FLUORIDE | 19032THBLL1640D | 0 | | | 0 | | 0 | 0 |
| PHOSPHORIC ACID | 19032THBLL1640D | 0 | | | 0 | | 0 | 0 |
| GLYCOL ETHERS | 19032THBLL1640D | 0.001 | na | HEAST | 0 | | 0.07 | 0 |
| 1,1,1-TRICHLOROETHANE | 19016TLDYN4THTO | 0.09 | na | w/d from iris and heast | 0 | | 6.3 | 0 |
| DIETHANOLAMINE | 19061BPLCMPOSTR | 0 | | | 0 | | 0 | 0 |
| NICKEL | 19061BPLCMPOSTR | 0.02 | medium | iris | 0 | | 1.4 | 0 |
| PHOSPHORIC ACID | 19061BPLCMPOSTR | 0 | | | 0 | | 0 | 0 |
| SULFURIC ACID | 19061BPLCMPOSTR | 0 | | | 0 | | 0 | 0 |
| 1,2,4-TRIMETHYLBENZENE | 19061BPLCMPOSTR | 0 | | | 0 | | 0 | 0 |
| CYCLOHEXANE | 19061BPLCMPOSTR | 0 | | | 0 | | 0 | 0 |
| HYDROGEN FLUORIDE | 19061BPLCMPOSTR | 0 | | | 0 | | 0 | 0 |
| ETHYLENE | 19061BPLCMPOSTR | 0 | | | 0 | | 0 | 0 |
| PROPYLENE | 19061BPLCMPOSTR | 0 | | | 0 | | 0 | 0 |
| AMMONIA | 19061BPLCMPOSTR | 0 | | | 0 | | 0 | 0 |
| METHANOL | 19061BPLCMPOSTR | 0.5 | medium | iris | 0 | | 35 | 0 |
| XYLENE (MIXED ISOMERS) | 19061BPLCMPOSTR | 2 | medium | iris | 0 | | 140 | 0 |
| ETHYLBENZENE | 19061BPLCMPOSTR | 0.1 | low | iris | 0 | | 7 | 0 |
| TETRACHLOROETHYLENE | 19061BPLCMPOSTR | 0.01 | medium | iris | 0.052 | c-b2 | 0.7 | 0.2639519 |
| TOLUENE | 19061BPLCMPOSTR | 0.2 | medium | iris | 0 | | 14 | 0 |
| 1,2-DICHLOROETHANE | 19061BPLCMPOSTR | 0 | | | 0.091 | B2 | 0 | 0.1148106 |
| NAPHTHALENE | 19061BPLCMPOSTR | 0.004 | na | ECAO: Risk Assessment 2/92 | 0 | | 0.28 | 0 |
| METHYL TERT-BUTYL ETHER | 19061BPLCMPOSTR | 0.005 | na | | 0 | | 0.35 | 0 |
| BENZENE | 19061BPLCMPOSTR | 0 | | | 0.029 | A | 0 | 0.2413794 |
| SULFURIC ACID | 19013BNGHLINDUS | 0 | | | 0 | | 0 | 0 |
| METHYL ETHYL KETONE | 19013BNGHLINDUS | 0.6 | low | iris | 0 | | 42 | 0 |
| TOLUENE | 19013BNGHLINDUS | 0.2 | medium | iris | 0 | | 14 | 0 |

## CHES[illegible]RISK PROJECT

## TABLE 4-28

1992 TRI FOR REGION III
DELAWARE CO., PA

TOXICITY DATA:

| Chemical Name | Facility ID# | Reference Dose (RfD) | Confidence Statement | Reference Dose Status | Cancer Potency (CPF) | Weight of Evidence | RfD Index Dose | CPF Index Dose |
|---|---|---|---|---|---|---|---|---|
| CHROMIUM | 19013PNNSY100BE | 0 | | | 0 | | 0 | 0 |
| NICKEL | 19013PNNSY100BE | 0.02 | medium | iris | 0 | | 1.4 | 0 |
| SULFURIC ACID | 19013NRTHM1200W | 0 | | | 0 | | 0 | 0 |
| AMMONIA | 19013NRTHM1200W | 0 | | | 0 | | 0 | 0 |
| PHOSPHORIC ACID | 19331CNCRDCONCH | 0 | | | 0 | | 0 | 0 |
| AMMONIA | 19331CNCRDCONCH | 0 | | | 0 | | 0 | 0 |
| ETHYLENE | 19061PSLNPBLUEB | 0 | | | 0 | | 0 | 0 |
| PROPYLENE | 19061PSLNPBLUEB | 0 | | | 0 | | 0 | 0 |
| CHROMIUM COMPOUNDS | 19013THPQCFRONT | 0.005 | low | iris | 0 | | 0.35 | 0 |
| FORMALDEHYDE | 19050HYDRL520CO | 0.2 | medium | iris | 0 | | 14 | 0 |
| NAPHTHALENE | 19061CNGLMRIDGE | 0.004 | na | ECAO: Risk Assessment 2/92 | 0 | | 0.28 | 0 |
| BUTYL BENZYL PHTHALATE | 19061CNGLMRIDGE | 0.2 | low | iris | 0 | C | 14 | 0 |
| FREON 113 | 19014MCGND9CRO2 | 30 | low | iris | 0 | | 2100 | 0 |
| 1,1,1-TRICHLOROETHANE | 19014MCGND9CRO2 | 0.09 | na | w/d from iris and heast | 0 | | 6.3 | 0 |
| COPPER COMPOUNDS | 19013HRCST651E9 | 0.005 | medium | iris | 0 | | 0.35 | 0 |
| 1,1,1-TRICHLOROETHANE | 19015RBNDS2RACE | 0.09 | na | w/d from iris and heast | 0 | | 6.3 | 0 |
| ACETONE | 19015RBNDS2RACE | 0.1 | low | iris | 0 | | 7 | 0 |
| XYLENE (MIXED ISOMERS) | 19023SNTRY237MI | 2 | medium | iris | 0 | | 140 | 0 |
| TOLUENE | 19023SNTRY237MI | 0.2 | medium | iris | 0 | | 14 | 0 |
| METHANOL | 19014CSTMC8CROZ | 0.5 | medium | iris | 0 | | 35 | 0 |
| DIBUTYL PHTHALATE | 19029SSCHM48POW | 0.1 | low | iris | 0 | | 7 | 0 |
| METHYL METHACRYLATE | 19029SSCHM48POW | 0.08 | na | HEAST | 0 | | 5.6 | 0 |
| TOLUENE | 19014NTRNT11CRO | 0.2 | medium | iris | 0 | | 14 | 0 |
| 1,1,1-TRICHLOROETHANE | 19018LTTNSMARPL | 0.09 | na | w/d from iris and heast | 0 | | 6.3 | 0 |
| NICKEL | 19018BCHNNPENNJ | 0.02 | medium | iris | 0 | | 1.4 | 0 |
| TOLUENE | 19018BCHNNPENNJ | 0.2 | medium | iris | 0 | | 14 | 0 |
| 1,1,1-TRICHLOROETHANE | 19018BCHNNPENNJ | 0.09 | na | w/d from iris and heast | 0 | | 6.3 | 0 |
| N-BUTYL ALCOHOL | 19014ZNTHP200CO | 0.1 | low | iris | 0 | | 7 | 0 |

# *CHESTER RISK PROJECT*

## *TABLE 4-28*

**1992 TRI FOR REGION III**
**DELAWARE CO., PA**

| Chemical Name | Facility ID# | Facility Name | Street Address | Zip Code | City | County | Latitude | Longitude | SIC Code |
|---|---|---|---|---|---|---|---|---|---|
| TRICHLOROETHYLENE | 19013BNGHLINDUS | BOEING DEFENSE & SPACE GROUP | STEWART AVE. & INDUSTRIAL HWY. | 19103 | RIDLEY PARK | DELAWARE | 395251 | -751932 | 3721 |
| ACETONE | 19013BNGHLINDUS | BOEING DEFENSE & SPACE GROUP | STEWART AVE. & INDUSTRIAL HWY. | 19103 | RIDLEY PARK | DELAWARE | 395251 | -751932 | 3721 |
| METHYL ISOBUTYL KETONE | 19013BNGHLINDUS | BOEING DEFENSE & SPACE GROUP | STEWART AVE. & INDUSTRIAL HWY. | 19103 | RIDLEY PARK | DELAWARE | 395251 | -751932 | 3721 |
| SULFURIC ACID | 19013SCTFM1500E | FOAMEX L.P. | 1500 E. 2ND ST. | 19022 | EDDYSTONE | DELAWARE | 395119 | -717006 | 3086 |
| TOLUENEDIISOCYANATE (MIXED ISC | 19013SCTFM1500E | FOAMEX L.P. | 1500 E. 2ND ST. | 19022 | EDDYSTONE | DELAWARE | 395119 | -717006 | 3086 |
| DICHLOROMETHANE | 19013SCTFM1500E | FOAMEX L.P. | 1500 E. 2ND ST. | 19022 | EDDYSTONE | DELAWARE | 395119 | -717006 | 3086 |
| HYDROCHLORIC ACID | 19013SCTTPFRONT | SCOTT PAPER CO. | FRONT & AVE. OF THE STATES | 19013 | CHESTER | DELAWARE | 395042 | -752124 | 2621 |
| SULFURIC ACID | 19013SCTTPFRONT | SCOTT PAPER CO. | FRONT & AVE. OF THE STATES | 19013 | CHESTER | DELAWARE | 395042 | -752124 | 2621 |
| BUTYL BENZYL PHTHALATE | 19013SCTTPFRONT | SCOTT PAPER CO. | FRONT & AVE. OF THE STATES | 19013 | CHESTER | DELAWARE | 395042 | -752124 | 2621 |
| CHLOROFORM | 19013SCTTPFRONT | SCOTT PAPER CO. | FRONT & AVE. OF THE STATES | 19013 | CHESTER | DELAWARE | 395042 | -752124 | 2621 |
| SULFURIC ACID | 19013WTCCR3300W | WITCO CORP. | 3300 W. 4TH ST. | 19061 | TRAINER | DELAWARE | 394948 | -752400 | 2843 |
| METHANOL | 19013WTCCR3300W | WITCO CORP. | 3300 W. 4TH ST. | 19061 | TRAINER | DELAWARE | 394948 | -752400 | 2843 |
| 2-METHOXYETHANOL | 19013WTCCR3300W | WITCO CORP. | 3300 W. 4TH ST. | 19061 | TRAINER | DELAWARE | 394948 | -752400 | 2843 |
| CHLORINE | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| CRESOL (MIXED ISOMERS) | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| ETHYLENE GLYCOL | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| PHENOL | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| SULFURIC ACID | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| 1,3-BUTADIENE | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| CYCLOHEXANE | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| 1,2,4-TRIMETHYLBENZENE | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| AMMONIA | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| PROPYLENE | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| ETHYLENE | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| ZINC COMPOUNDS | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| METHANOL | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| XYLENE (MIXED ISOMERS) | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| ETHYLBENZENE | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| TOLUENE | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| CHROMIUM COMPOUNDS | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| ANTIMONY COMPOUNDS | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| METHYL TERT-BUTYL ETHER | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| BENZENE | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |
| ETHYLENE OXIDE | 19061SNRFNGREEN | SUN REFINING & MARKETING CO. | GREEN ST. & DELAWARE AVE. | 190610426 | MARCUS HOOK | DELAWARE | 394800 | -752600 | 2911 |

## CHES[illegible]R RISK PROJECT

## TABLE 4-28

**1992 TRI FOR REGION III**
**DELAWARE CO., PA**

| Chemical Name | Facility ID# | Facility Name | Street Address | Zip Code | City | County | Latitude | Longitude | SIC Code |
|---|---|---|---|---|---|---|---|---|---|
| XYLENE (MIXED ISOMERS) | 19014ZNTHP200CO | ZENITH PRODUCTS CORP. | 200 COMMERCE DR. | 19014 | ASTON | DELAWARE | 395215 | -750015 | 2514 |
| TOLUENE | 19014ZNTHP200CO | ZENITH PRODUCTS CORP. | 200 COMMERCE DR. | 19014 | ASTON | DELAWARE | 395215 | -750015 | 2514 |
| ETHYLENE GLYCOL | 19032MZRCH1830C | PPG IND. INC. | 1830 COLUMBIA AVE. | 19032 | FOLCROFT | DELAWARE | 395319 | -751637 | 2843 |
| DIETHANOLAMINE | 19032MZRCH1830C | PPG IND. INC. | 1830 COLUMBIA AVE. | 19032 | FOLCROFT | DELAWARE | 395319 | -751637 | 2843 |
| DIETHYL SULFATE | 19032MZRCH1830C | PPG IND. INC. | 1830 COLUMBIA AVE. | 19032 | FOLCROFT | DELAWARE | 395319 | -751637 | 2843 |
| GLYCOL ETHERS | 19032MZRCH1830C | PPG IND. INC. | 1830 COLUMBIA AVE. | 19032 | FOLCROFT | DELAWARE | 395319 | -751637 | 2843 |
| CHLOROMETHANE | 19032MZRCH1830C | PPG IND. INC. | 1830 COLUMBIA AVE. | 19032 | FOLCROFT | DELAWARE | 395319 | -751637 | 2843 |
| BENZYL CHLORIDE | 19032MZRCH1830C | PPG IND. INC. | 1830 COLUMBIA AVE. | 19032 | FOLCROFT | DELAWARE | 395319 | -751637 | 2843 |
| DECABROMODIPHENYL OXIDE | 19013TRSCQ800WF | TRS ACQUISITION CORP. | 800 W. FRONT ST. | 19013 | CHESTER | DELAWARE | 395000 | -752230 | 2952 |
| XYLENE (MIXED ISOMERS) | 19050JLNBS300EB | JULIAN B. SLEVIN CO. INC. | 300 E. BALTIMORE AVE. | 19050 | LANSDOWNE | DELAWARE | 395600 | -751900 | 2699 |
| TOLUENE | 19050JLNBS300EB | JULIAN B. SLEVIN CO. INC. | 300 E. BALTIMORE AVE. | 19050 | LANSDOWNE | DELAWARE | 395600 | -751900 | 2699 |
| HYDROCHLORIC ACID | 19032THBLL1640D | BULLEN COMPANIES | 1640 DELMAR DR. | 19032 | FOLCROFT | DELAWARE | 395343 | -751640 | 2842 |
| HYDROGEN FLUORIDE | 19032THBLL1640D | BULLEN COMPANIES | 1640 DELMAR DR. | 19032 | FOLCROFT | DELAWARE | 395343 | -751640 | 2842 |
| PHOSPHORIC ACID | 19032THBLL1640D | BULLEN COMPANIES | 1640 DELMAR DR. | 19032 | FOLCROFT | DELAWARE | 395343 | -751640 | 2842 |
| GLYCOL ETHERS | 19032THBLL1640D | BULLEN COMPANIES | 1640 DELMAR DR. | 19032 | FOLCROFT | DELAWARE | 395343 | -751640 | 2842 |
| 1,1,1-TRICHLOROETHANE | 19016TLDYN4THTO | TELEDYNE PACKAGING | 4TH & TOWNSEND STS. | 19016 | CHESTER | DELAWARE | 395030 | -752150 | 3499 |
| DIETHANOLAMINE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| NICKEL | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| PHOSPHORIC ACID | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| SULFURIC ACID | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| 1,2,4-TRIMETHYLBENZENE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| CYCLOHEXANE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| HYDROGEN FLUORIDE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| ETHYLENE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| PROPYLENE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| AMMONIA | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| METHANOL | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| XYLENE (MIXED ISOMERS) | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| ETHYLBENZENE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| TETRACHLOROETHYLENE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| TOLUENE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| 1,2-DICHLOROETHANE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| NAPHTHALENE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| METHYL TERT-BUTYL ETHER | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| BENZENE | 19061BPLCMPOSTRBP | EXPLORATION & OIL INC. | POST RD. | 19061 | TRAINER | DELAWARE | 394900 | -752400 | 2911 |
| SULFURIC ACID | 19013BNGHLINDUS | BOEING DEFENSE & SPACE GROUP | STEWART AVE. & INDUSTRIAL HWY. | 19103 | RIDLEY PARK | DELAWARE | 395251 | -751932 | 3721 |
| METHYL ETHYL KETONE | 19013BNGHLINDUS | BOEING DEFENSE & SPACE GROUP | STEWART AVE. & INDUSTRIAL HWY. | 19103 | RIDLEY PARK | DELAWARE | 395251 | -751932 | 3721 |
| TOLUENE | 19013BNGHLINDUS | BOEING DEFENSE & SPACE GROUP | STEWART AVE. & INDUSTRIAL HWY. | 19103 | RIDLEY PARK | DELAWARE | 395251 | -751932 | 3721 |

CHESTER RISK PROJECT

TABLE 4-32

MAXIMUM CARCINOGENIC RISKS IN AIR

| CHEMICAL | MAXIMUM PREDICTED CONCENTRATION ($ug/m^3$) | RISK-BASED LEVEL ($ug/m^3$) | CARCINOGENIC RISK* |
|---|---|---|---|
| chromium VI | 0.0047 | 0.00015 | 3E-05 |
| benzene | 2.8 | 0.22 | 1E-05 |
| gasoline | 0.19 | 5.10E-05 $(ug/m^3)^{-1}$** | 9E-06 |
| 1,3-butadiene | 0.044 | 0.0064 | 7E-06 |
| cadmium | 0.0067 | 0.00099 | 7E-06 |
| arsenic | 0.0022 | 0.00041 | 5E-06 |
| diesel | 0.24 | 1.70E-05 $(ug/m^3)^{-1}$** | 4E-06 |
| crotonaldehyde | 0.012 | 0.0033 | 3E-06 |
| acrylonitrile | 0.042 | 0.026 | 2E-06 |
| formaldehyde | 0.30 | 0.14 | 2E-06 |
| vinyl chloride | 0.025 | 0.021 | 1E-06 |

*Value represents the maximum carcinogenic risk posed by an individual chemical at a specific location.

**Value represents the unit risk for this compound.

CHESTER RISK PROJECT

TABLE 4-33

MAXIMUM NON-CANCER THREATS IN AIR

| CHEMICAL | MAXIMUM PREDICTED CONCENTRATION ($ug/m^3$) | RISK-BASED LEVEL ($ug/m^3$) | HAZARD QUOTIENT* |
|---|---|---|---|
| hydrogen chloride | 17 | 7.3 | 2.4 |
| acrolein | 0.33 | 0.021 | 1.6 |
| 2-methoxyethanol | 19 | 21 | 0.9 |
| mercury (inorganic) | 0.061 | 0.31 | 0.2 |

*Value represents the maximum non-cancer threat, as predicted by the Hazard Quotient, posed by an individual chemical at a specific location.

CHESTER RISK PROJECT

TABLE 4-34

MAXIMUM RATIO OF PREDICTED CONCENTRATIONS
OF CRITERIA POLLUTANTS TO
NATIONAL AMBIENT AIR QUALITY STANDARDS

| CHEMICAL | MAXIMUM PREDICTED CONCENTRATION ($ug/m^3$) | NATIONAL AMBIENT AIR QUALITY STANDARD ($ug/m^3$)* | RATIO** |
|---|---|---|---|
| carbon monoxide (1 hour) | 1960 | 40,000 | 0.05 |
| carbon monoxide (8 hours) | 675 | 10,000 | 0.07 |
| lead (quarter) | 0.11*** | 1.5 | 0.08 |
| nitrogen dioxide (annual) | 32 | 100 | 0.3 |
| ozone (1 hour) | **** | 235 | - |
| PM-10 (24 hours) | 70 | 150 | 0.5 |
| PM-10 (annual) | 14 | 50 | 0.3 |
| sulfur dioxide (3 hours) | 372 | 1300 | 0.3 |
| sulfur dioxide (24 hours) | 170 | 365 | 0.5 |
| sulfur dioxide (annual) | 41 | 80 | 0.5 |

*Please refer to Table 4-31 for a detailed explanation of each standard.

**Value represents the ratio between the maximum predicted concentration and the National Ambient Air Quality Standard.

***The modeled concentration for lead represents an annual average level, rather than a quarterly concentration. Although the annual average level was compared to the quarterly standard for lead, inaccuracies related to such a comparison are insignificant in the context of this study.

****Ozone was not evaluated in the air modeling exercise.

# CHESTER COUNTY RISK PROJECT
## TABLE 4-29
## SUMMARY RANKING FOR
## TOTAL ONSITE RELEASES

| | Facility Name | City | Total Onsite Residual Mass Sums | Total Onsite Chronic Index Relative Hazard | Total Onsite Chronic Index and Residual Mass Relative Hazard |
|---|---|---|---|---|---|
| 28 | PENNSYLVANIA MACHINE WORK | ASTON | 0 | 0 | 0 |
| 27 | PQ CORP | CHESTER | 5 | 17730 | 17730 |
| 26 | HYDROL CHEMICAL CO. | YEADON | 619 | 54874 | 54874 |
| 25 | CONGOLEUM CORP. | MARCUS HOOK | 515 | 89093 | 89093 |
| 24 | MCGEE INDUSTRIES INC. | ASTON | 1750 | 197443 | 197443 |
| 23 | HARCAST CO. INC. | CHESTER | 103 | 365237 | 365237 |
| 22 | ORB IND. INC. | UPLAND | 2800 | 518108 | 518108 |
| 21 | SENTRY PAINT TECH. | DARBY | 10200 | 577110 | 577110 |
| 20 | CUSTOM COMPOUNDING INC. | ASTON | 16528 | 586081 | 586081 |
| 19 | ESSCHEM CO. | ESSINGTON | 2965 | 657116 | 657116 |
| 18 | NORTH AMERICA SILICA | CHESTER | 1700 | 0 | 865414 |
| 17 | INTERNATIONAL ENVELOPE CO. | ASTON | 11578 | 1026386 | 1026386 |
| 16 | CLIFTON PRECISION - N. | CLIFTON HEIGHTS | 5850 | 1152446 | 1152446 |
| 15 | BUCHAN IND. | CLIFTON HEIGHTS | 9266 | 1716830 | 1716830 |
| 14 | ZENITH PRODUCTS CORP. | ASTON | 46000 | 2023430 | 2023430 |
| 13 | CONCORD BEVERAGE CO. | CONCORDVILLE | 5045 | 0 | 2568245 |
| 12 | PPG IND. INC. | FOLCROFT | 1107 | 5107955 | 5107955 |
| 11 | TRS ACQUISITION CORP. | CHESTER | 3000 | 5318982 | 5318982 |
| 10 | JULIAN B. SLEVIN CO. INC. | LANSDOWNE | 108808 | 7869310 | 7869310 |
| 9 | BULLEN COMPANIES | FOLCROFT | 3000 | 13297456 | 13297456 |
| 8 | TELEDYNE PACKAGING | CHESTER | 111255 | 21917162 | 21917162 |
| 7 | BP EXPLORATION & OIL INC. | TRAINER | 108893 | 31579565 | 31579565 |
| 6 | EPSILON PRODS. CO. | MARCUS HOOK | 70200 | 0 | 35736527 |
| 5 | BOEING DEFENSE & SPACE GR | RIDLEY PARK | 184400 | 38308755 | 38308755 |
| 4 | FOAMEX L.P. | EDDYSTONE | 33698 | 39795173 | 39795173 |
| 3 | SCOTT PAPER CO. | CHESTER | 243600 | 41593391 | 41593391 |
| 2 | WITCO CORP. | TRAINER | 747045 | 8708446682 | 8708446682 |
| 1 | SUN REFINING & MARKETING C | MARCUS HOOK | 368956 | 17130461033 | 17130461033 |

| KEY | Order statistic | |
|---|---|---|
| | percentile | confidence limit |
| 90th percentile-65% confidence | 3 | 6 |

# APPENDIX II

# REFERENCES

REFERENCES V. 0.2


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# APPENDIX III

## EPIDEMIOLOGIC INFORMATION

## Age-adjusted incidence and mortality rates for Chester City, Delaware County and adjacent counties.

The enclosed tables describe the cancer experience for residents of Chester City, Delaware County and adjacent counties. The five cancer sites listed for males and females represent about 62 and 58 percent of the total cancer risk, respectively.

The elevated cancer risk among males for "all sites combined" in Chester City is characteristic of rates seen among black males (549.3, Chester City compared to 523.2 per 100,000 Pennsylvania black males). The rate was 25 percent greater than for all males in the state (549.3 compared to 439.3 per 100,000).

A significant proportion of the male cancers were lung and prostate. Together they represented 49 percent of the total cancer risk in the community. The most significant cause of lung cancer cancer is cigarette smoking which accounts for about 90 percent of all cases. There is no known environmental cause of prostate cancer.

Similarly, the cancer risk for "all sites combined" among females in Chester City is characteristic of rates seen among black females (353.0, Chester City compared to 360.3 per 100,000 Pennsylvania black females). The rate was 5 percent lower than for all females in the state (353.0 compared to 372.6 per 100,000). Lung and breast cancers account for 44 percent of the total cancer risk among females. There is no known environmental cause of breast cancer.

The death rates reflect the incidence rate and the survival by individual cancers. The total cancer death rate in the state for black males was 344 per 100,000 similar to the rate for Chester City males (348 per 100,000). While the death rate for females was 198.1 and 187.1 per 100,000 for Chester City females and Pennsylvania black females, respectively.

# Age-adjusted cancer mortality rates for Chester City, Delaware and adjacent counties, and Pennsylvania by sex, 1989-93

| | Chester City | Delaware Co. | Montgomery Co. | Chester Co. | Philadelphia C. | Pennsylvania |
|---|---|---|---|---|---|---|
| **MALES** | | | | | | |
| All Sites | 348.0 | 231.0 | 201.6 | 214.0 | 294.0 | 226.8 |
| Lung, trachea, etc | 127.8 | 79.8 | 62.7 | 68.3 | 101.9 | 75.6 |
| Colon-rectum | 27.4 | 27.0 | 25.7 | 23.0 | 32.0 | 26.8 |
| Prostate | 47.7 | 25.5 | 23.7 | 29.6 | 30.7 | 24.7 |
| Non-Hodgkin's Lym. | 8.4 | 7.0 | 7.7 | 6.6 | 7.9 | 7.9 |
| Leukemia | 12.2 | 7.8 | 8.3 | 8.0 | 8.8 | 8.3 |
| **FEMALES** | | | | | | |
| All Sites | 198.1 | 157.0 | 141.9 | 153.0 | 177.0 | 147.7 |
| Lung, trachea | 48.6 | 35.6 | 28.5 | 28.2 | 39.9 | 29.2 |
| Colon-rectum | 16.3 | 18.2 | 17.8 | 18.7 | 20.6 | 26.8 |
| Breast | 42.7 | 33.2 | 30.7 | 30.1 | 34.1 | 29.6 |
| Non-Hodgkin's Lym. | 4.8 | 4.7 | 4.8 | 6.6 | 4.8 | 5.3 |
| Leukemia | 4.8 | 5.7 | 4.1 | 4.9 | 5.0 | 5.1 |

age-adjusted to the 1970 US standard pop.
es per 100,000 population.

Source; PA Depat. of Health.

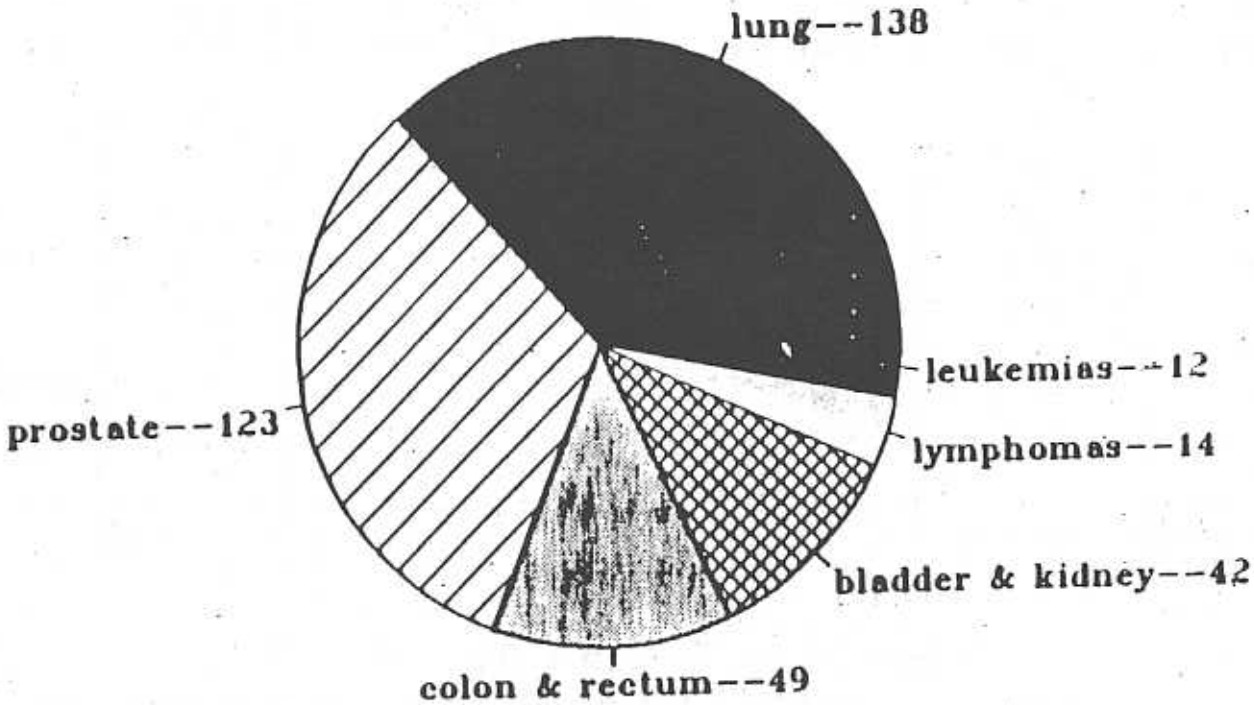
# Age-adjusted cancer incidence rates for Chester City, Delaware and adjacent counties, and Pennsylvania by sex, 1987-91

| | Chester City | Delaware Co. | Montgomery Co. | Chester Co. | Philadelphia C. | Pennsylvania |
|---|---|---|---|---|---|---|
| **MALES** | | | | | | |
| All Sites | 549.2 | 433.8 | 432.2 | 409.4 | 513.9 | 439.3 |
| Lung, trachea, etc | 150.7 | 86.1 | 72.4 | 79.1 | 111.6 | 84.7 |
| Colon/Rectum | 55.5 | 66.3 | 65.6 | 67.6 | 72.4 | 69.1 |
| Prostate | 122.1 | 99.9 | 106.0 | 97.3 | 108.0 | 95.1 |
| Kidney/Bladder | 43.5 | 42.2 | 45.1 | 37.4 | 42.8 | 44.5 |
| Lymphomas | 14.4 | 15.2 | 15.6 | 12.5 | 16.1 | 15.1 |
| Leukemias | 12.7 | 6.8 | 10.3 | 7.5 | 8.9 | 10.1 |
| **FEMALES** | | | | | | |
| All Sites | 353.0 | 366.6 | 372.7 | 370.3 | 385.7 | 372.6 |
| Lung, trachea, etc | 52.2 | 41.5 | 36.7 | 33.1 | 48.5 | 35.3 |
| Colon/Rectum | 41.9 | 44.4 | 47.8 | 51.3 | 47.0 | 47.3 |
| Breast | 103.1 | 124.2 | 131.9 | 125.3 | 119.1 | 117.2 |
| Kidney/Bladder | 10.6 | 13.8 | 12.6 | 12.4 | 14.4 | 14.1 |
| Lymphomas | 3.9 | 5.7 | 10.3 | 9.8 | 9.9 | 6.5 |
| Leukemias | 4.1 | 9.3 | 6.3 | 5.2 | 5.3 | 10.8 |

age-adjusted to the 1970 US standard pop.
rates per 100,000 population.

Source; PA Dept. of Health.

# Distribution of selected cancers diagnosed among residents of Chester City from 1987-1991
## MALES

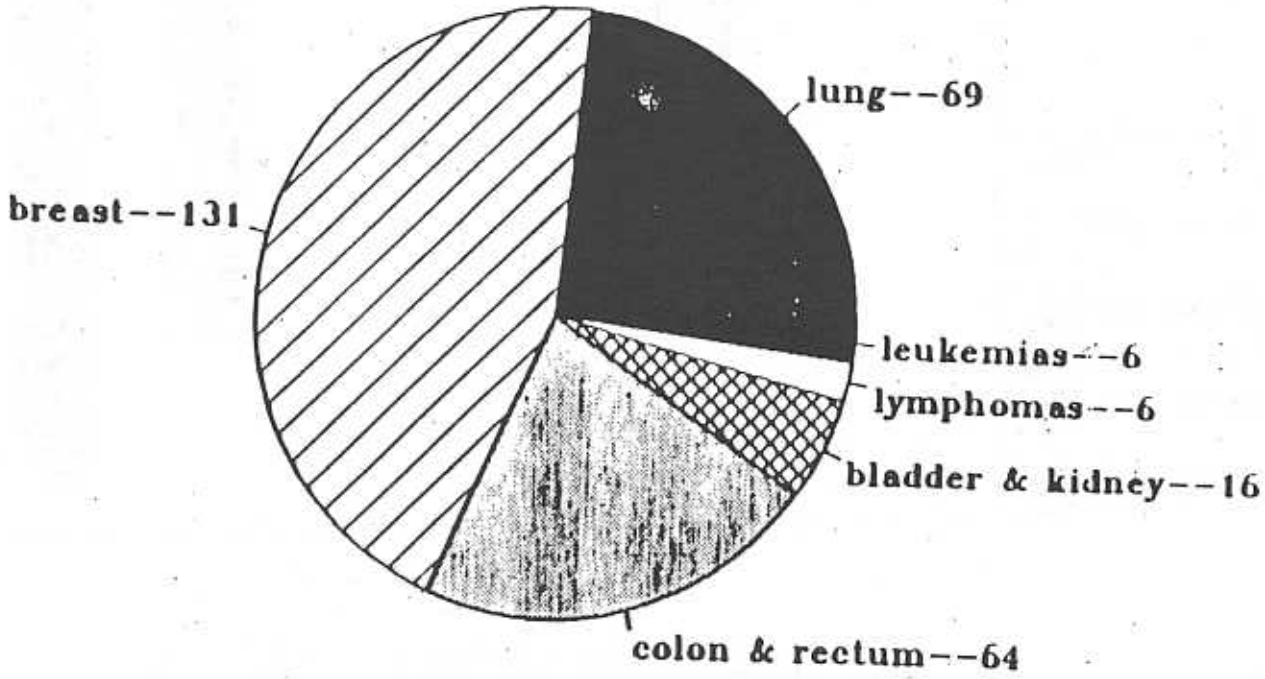



Cases = 378
72.6% of the total*

*521 total cancers among male residents

Source; PA Dept. of H[redacted]h

# Distribution of selected cancers diagnosed among residents of Chester City from 1987–1991
## FEMALES

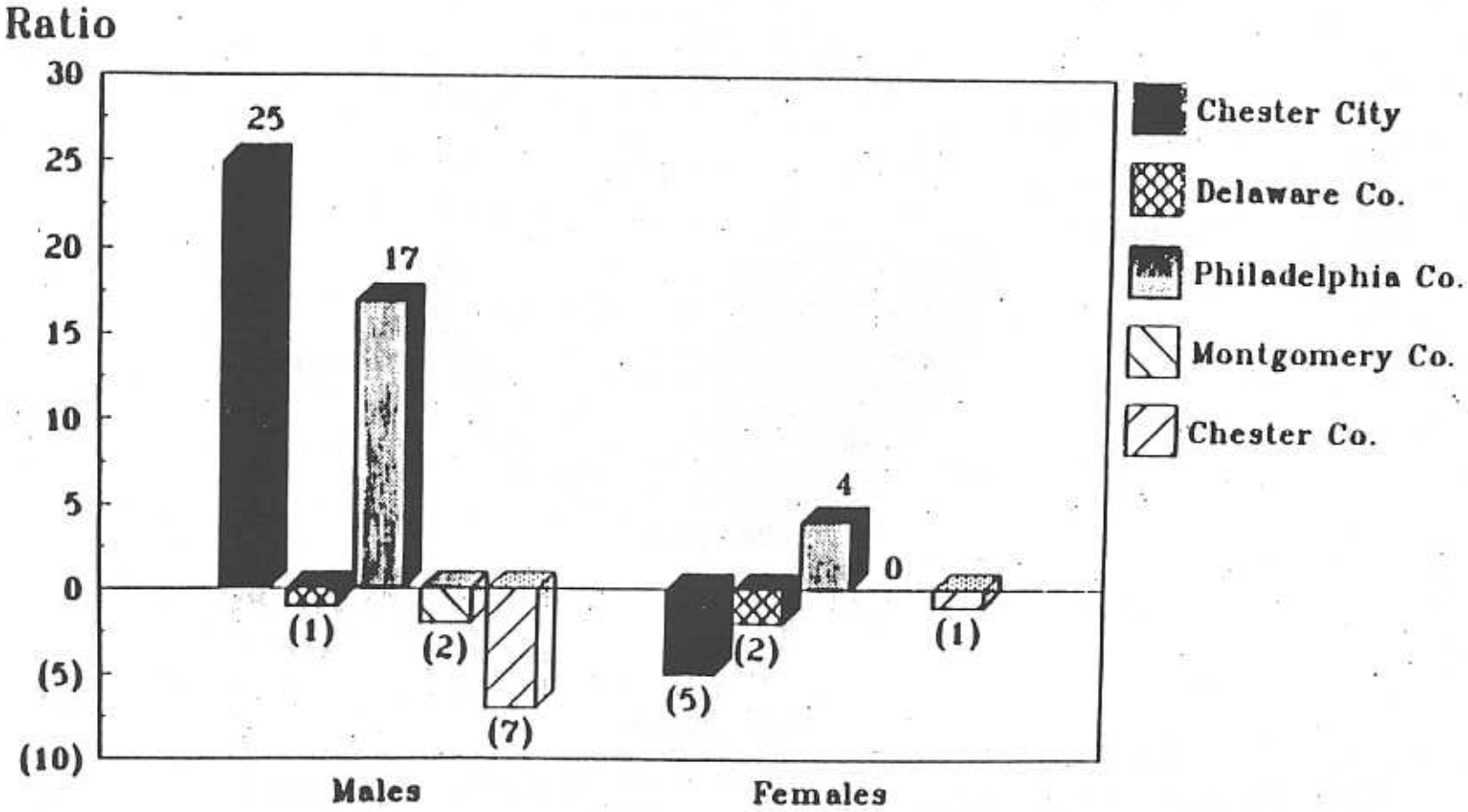



**Cases = 292**
**60.1% of the total•**

• 486 total cancers among female residents.

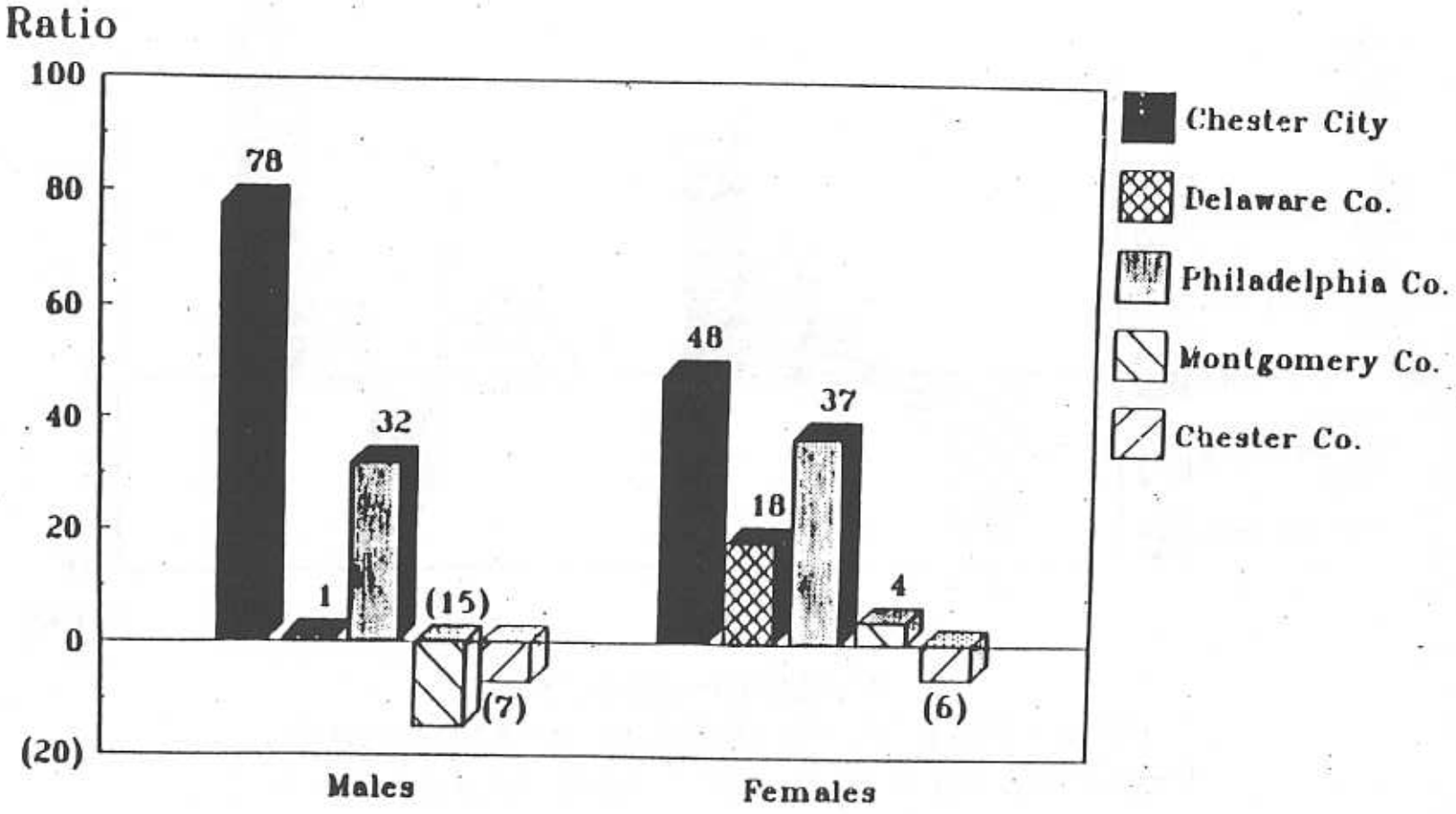
Source: PA Dep[illegible] of Health

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987–1991
## ALL CANCERS COMBINED



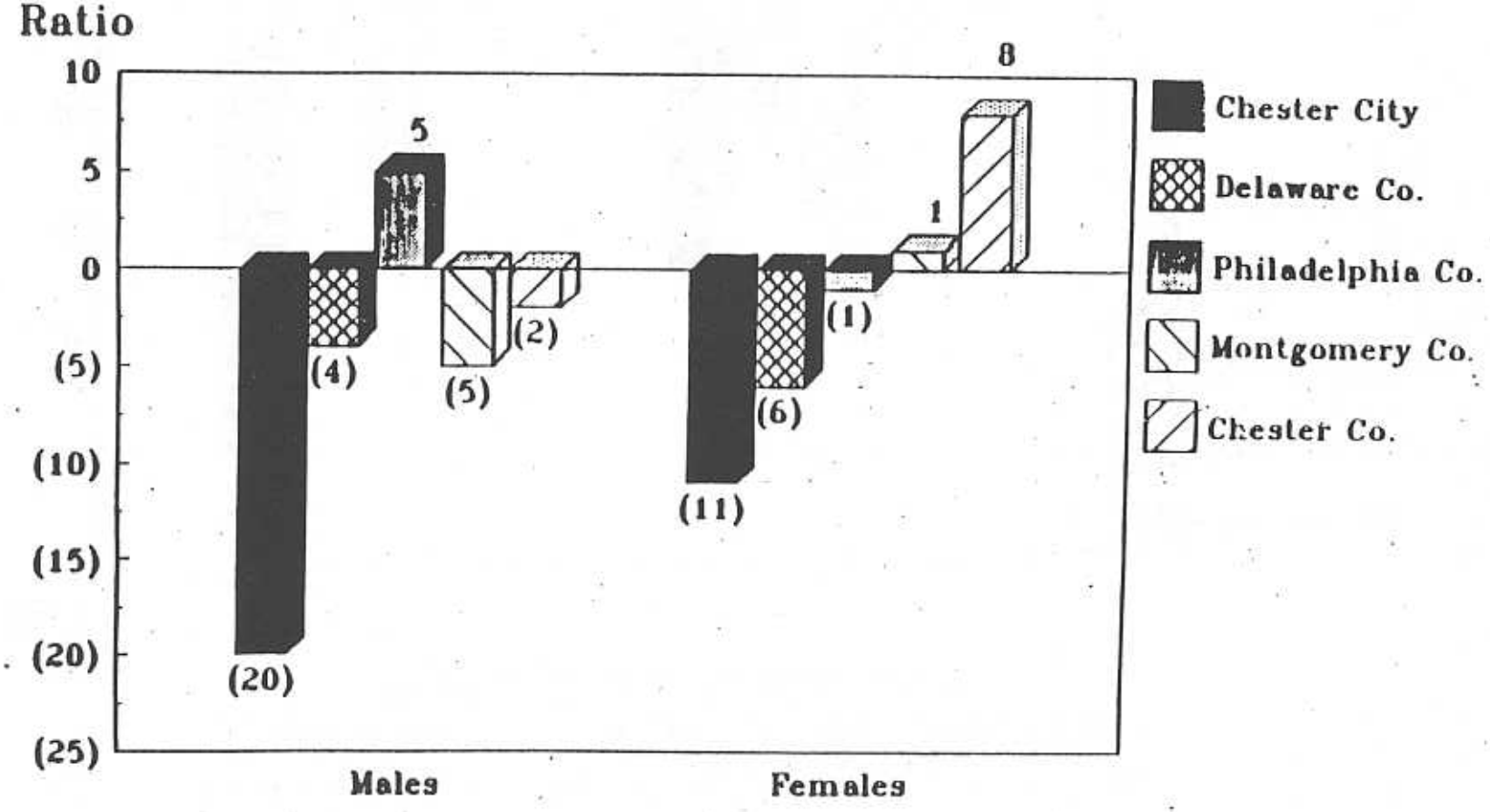

Source; PA Depat. of Health.

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987–1991
## LUNG, TRACHEA, BRONCHUS



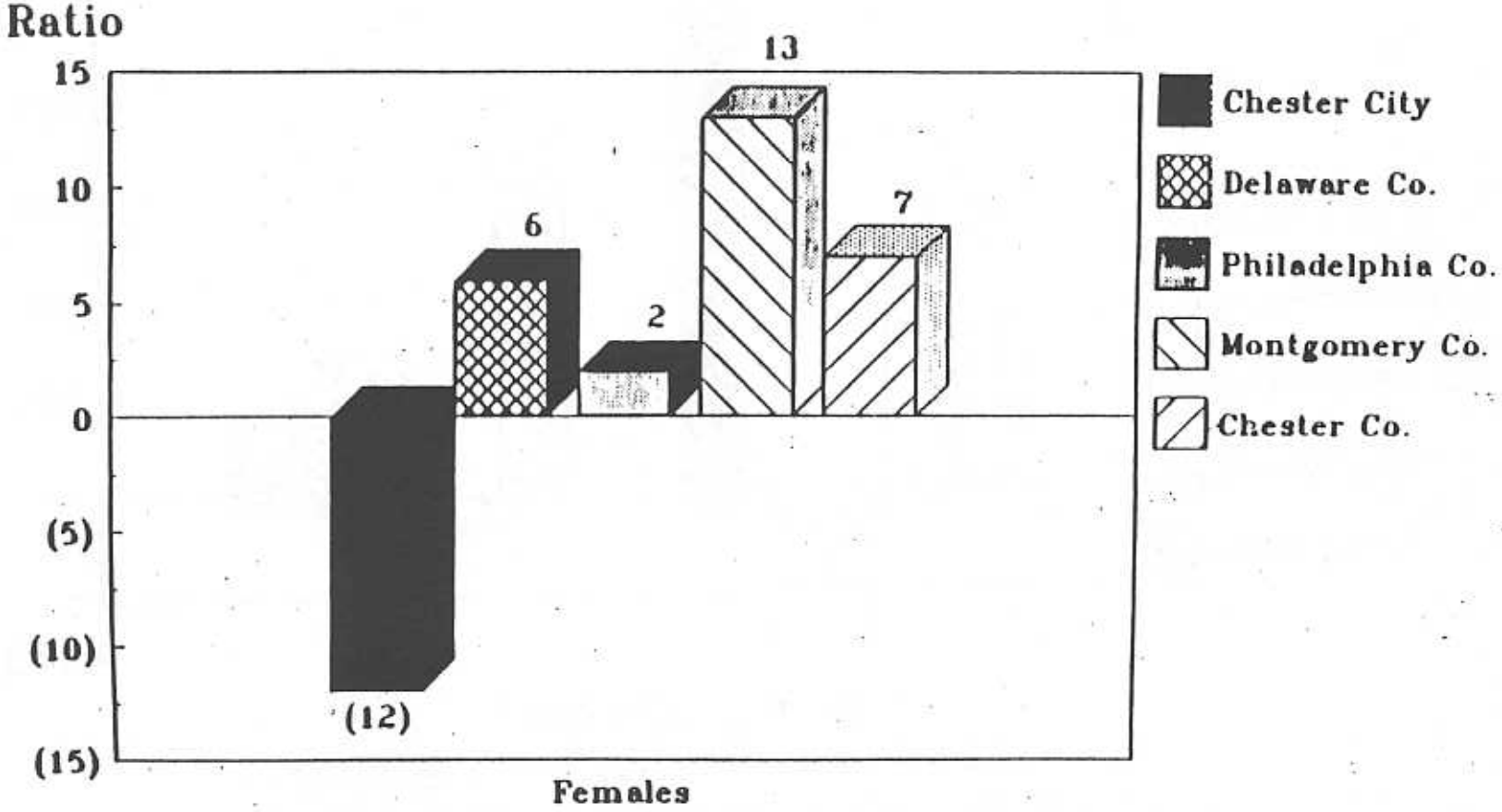

Source; PA Depat. of Health.

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987–1991
## COLON–RECTUM



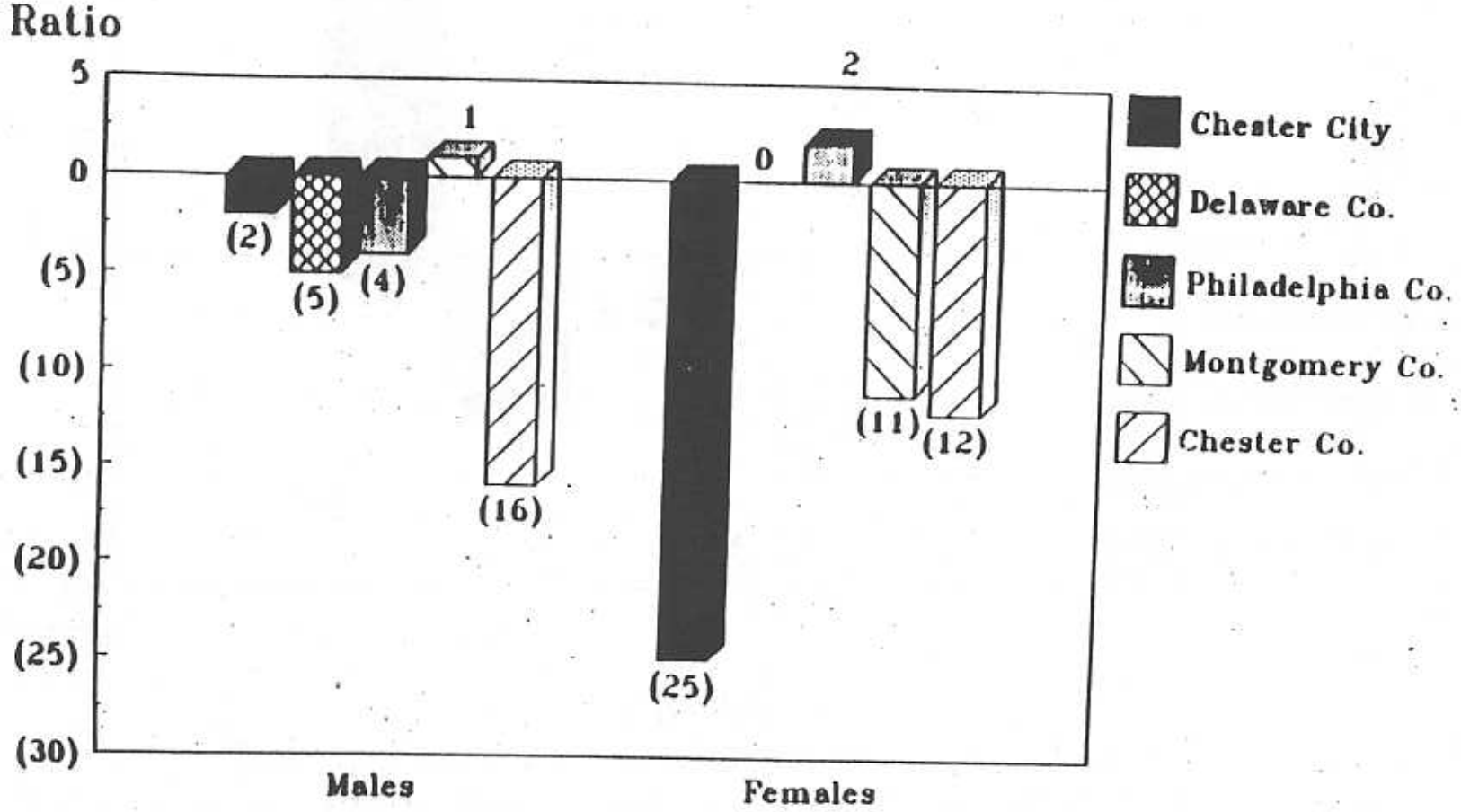

Source; PA Dept. of He[redacted].

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987–1991
## BREAST



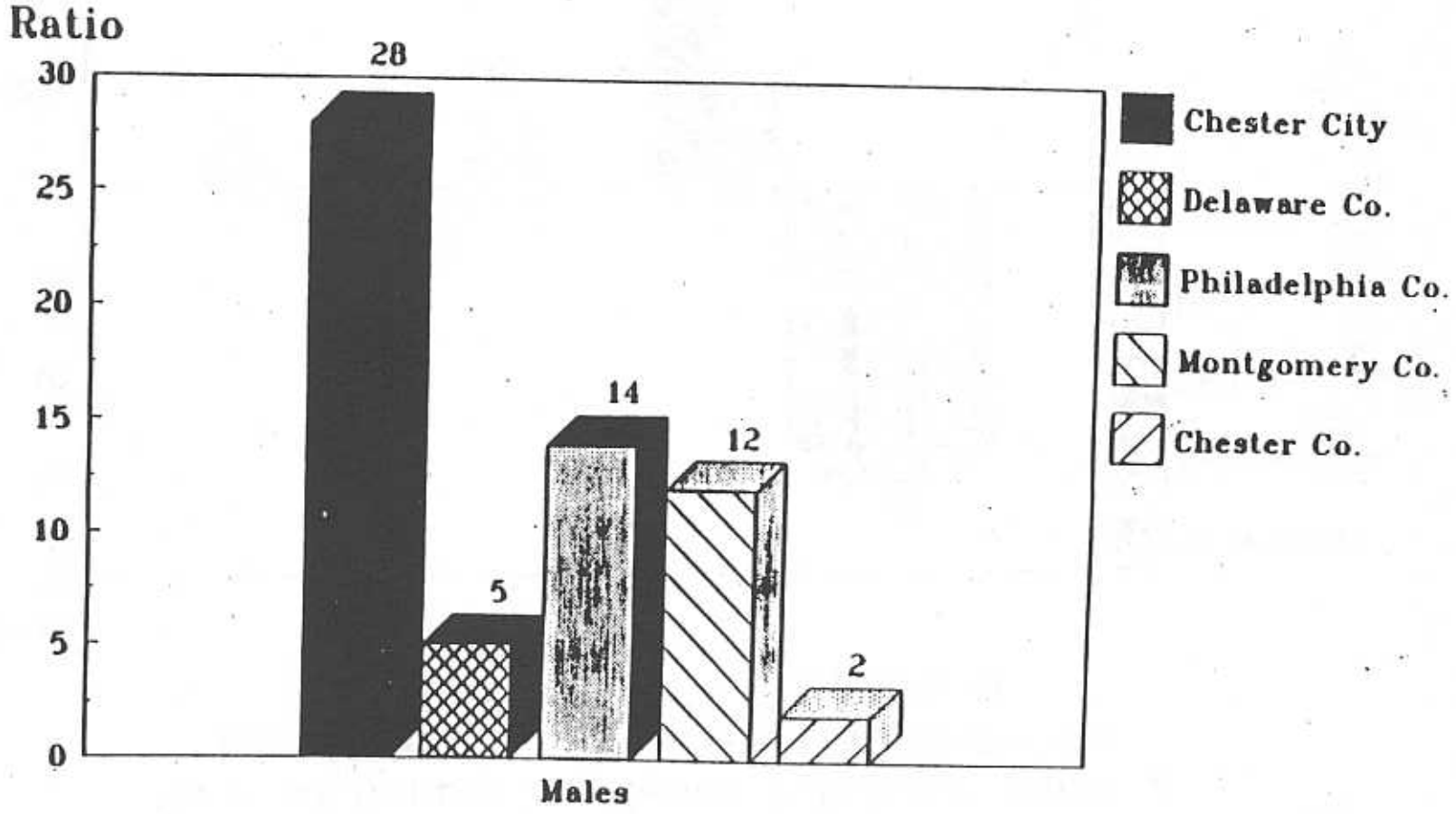

Source; PA Dept. of Health.

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987–1991
## KIDNEY/BLADDER



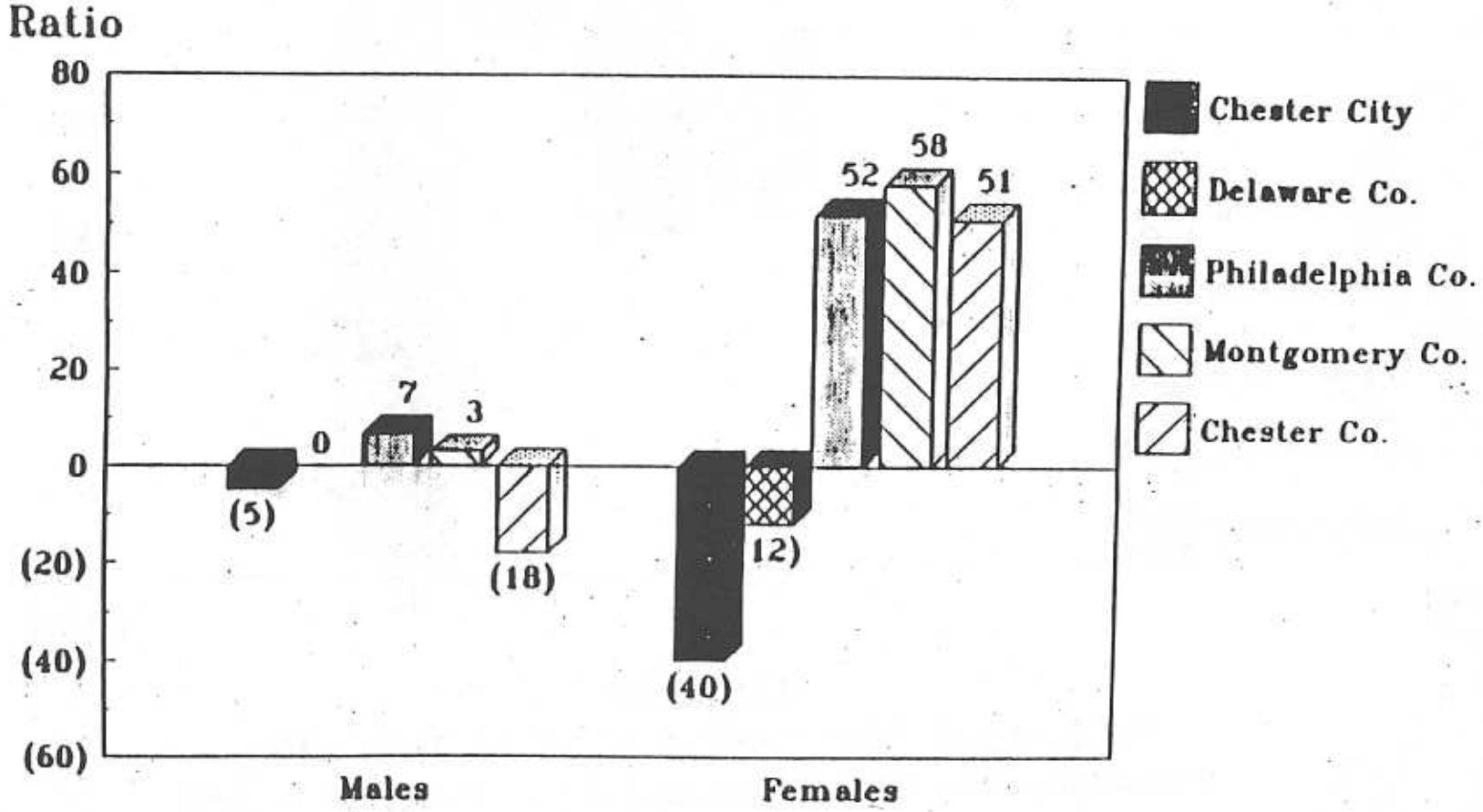

Source; PA Dept. of Hea

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987–1991
## PROSTATE



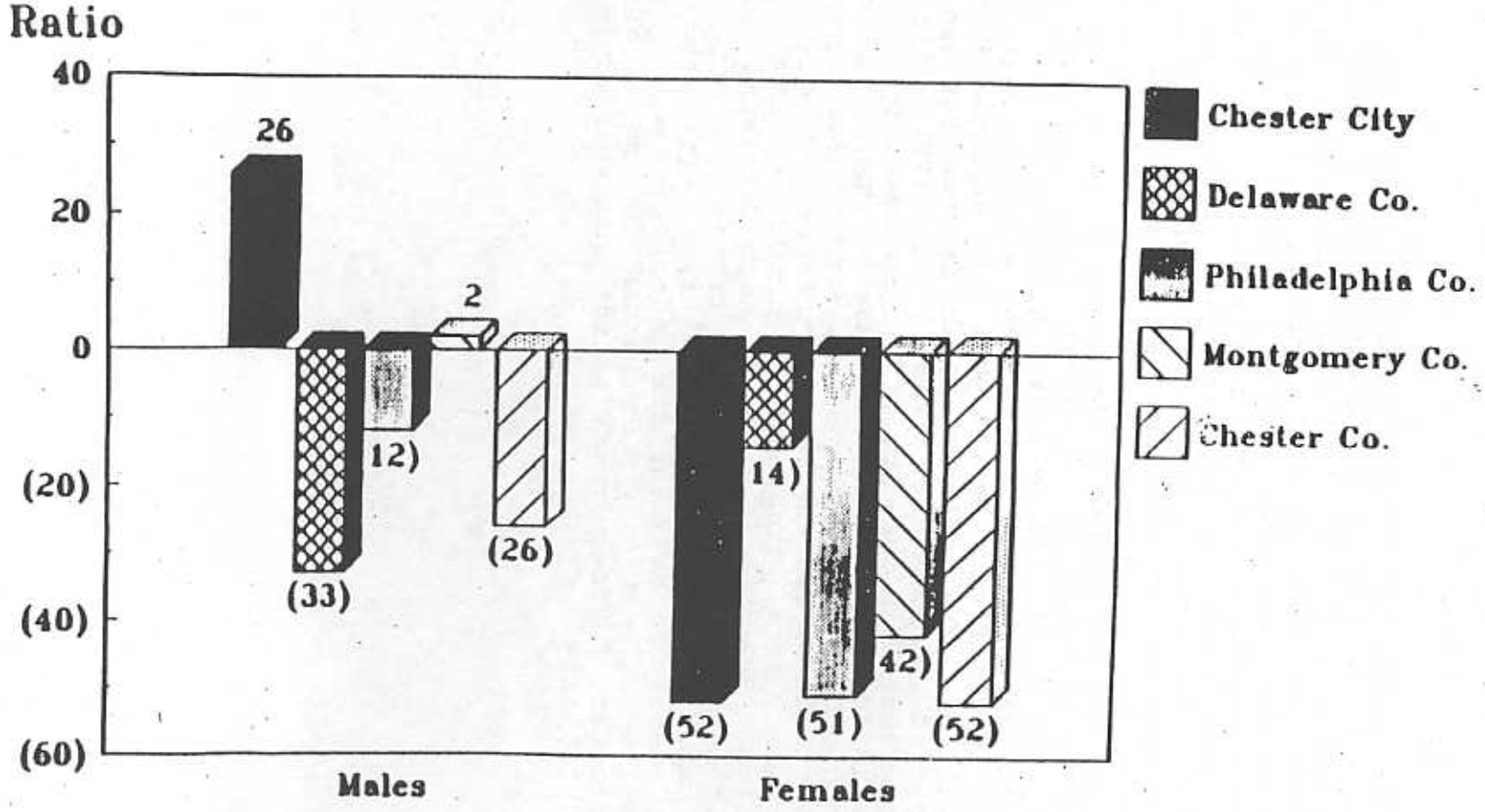

Source; PA Dept. of Health.

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987–1991
## NON-HODGKIN'S LYMPHOMAS




Source: Dept. of Health.

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987–1991
## LEUKEMIAS



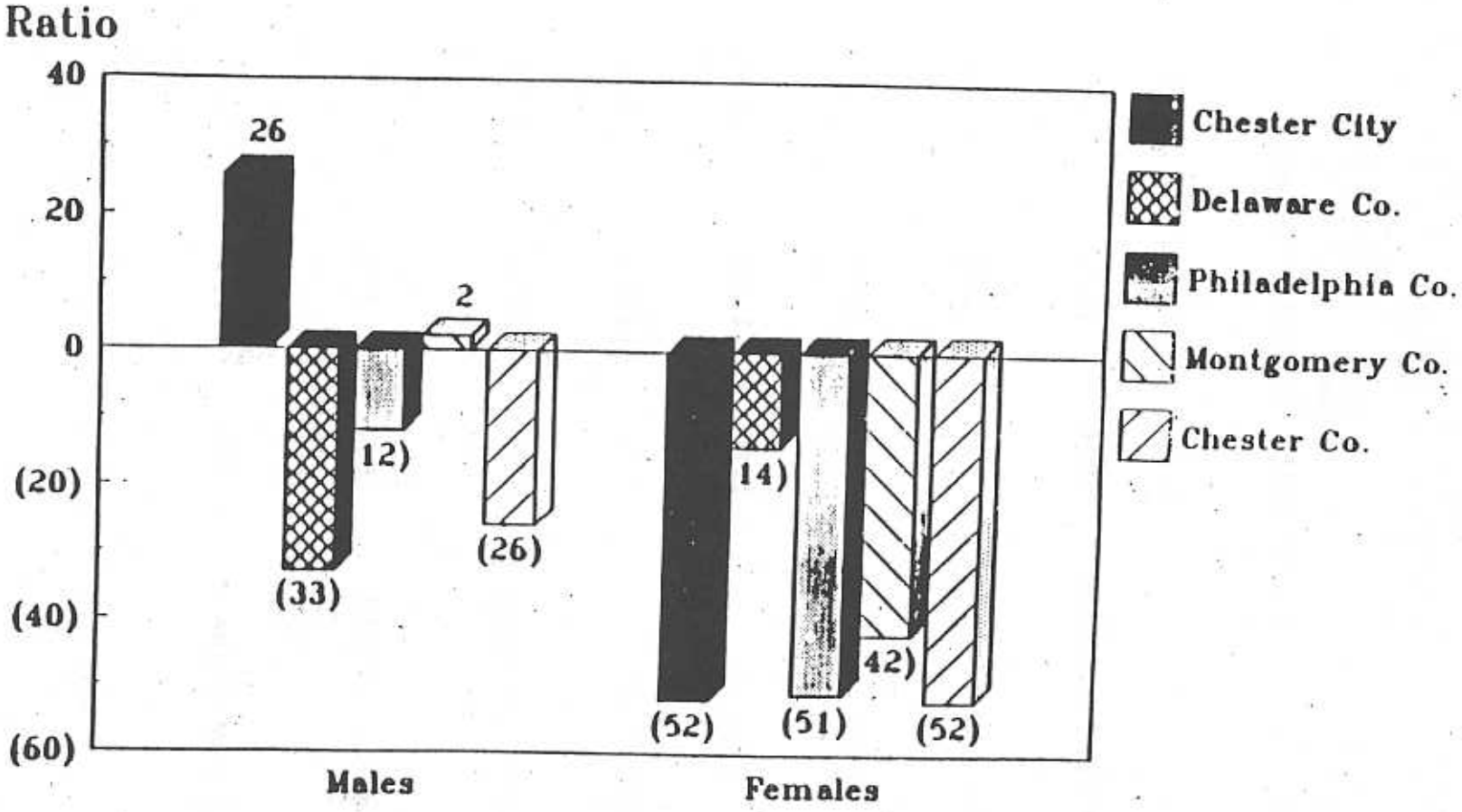

Source; PA Dept. of Health.

These ratios were calculated to provide an epidemiologic picture of the disease burden of the City of Chester compared to other Pennsylvania cities. The actual number of deaths in these selected cities' populations were compared with a calculated number of deaths for each city. These calculated deaths are the number of deaths expected from each city's population if that population had the same mortality rate as some standard population. For this exercise's purpose, the mortality rates of the whole Commonwealth were used as the standard. By multiplying each city's population by the Commonweath's rates for each cause of death, the expected number for each cause of death was obtained. This expected number was then divided into the actual number for each cause of death per city and multiplied by 100%. A number greater than 100% reflects an excess in actual deaths over expected deaths. A number less than 100% reflects less actual than expected deaths. And a ratio equal to 100% reflects no difference between the actual and expected deaths. For example, the 170% ratio for deaths from hypertension in the city of Chester means that there were 70% more deaths from hypertension in Chester than in the Commonwealth as a whole. These ratios are only estimates that cannot account for the muiltitude of factors that contribute to a particular population's mortality rate. Thus, caution should be used in interpreting these ratios. Specifically, one cannot determine a cause and effect relationship from any of these ratios. However, they do provide a valuable way of relatively quickly assessing and comparing disease burdens. For example, the ratio of 244% for deaths from live disease in the city of Chester is red warning flag strongly indicating further investigation into this cause of death in this municipality.

Mortality Ratios (1992 Mortality Rates)

| | Chstr | Lncstr | Nrrstwn | Phila | Pbrgh |
|---|---|---|---|---|---|
| Blood Pressure | 170% | 109% | 122% | 179% | 149% |
| Heart Attack | 83% | 86% | 88% | 86% | 111% |
| Stroke | 149% | 96% | 113% | 105% | 116% |
| Emphysema | 129% | 145% | 124% | 91% | 136% |
| Diabetes | 84% | 161% | 100% | 108% | 108% |
| Liver Disease | 244% | 175% | 163% | 157% | 134% |
| Pnuemonia-Flu | 159% | 89% | 87% | 94% | 133% |
| Kidney Disease | 88% | 79% | 119% | 123% | 135% |

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987–1991
## LEUKEMIAS




Source; PA Dept. of He[redacted].

These ratios were calculated to provide an epidemiologic picture of the disease burden of the City of Chester compared to other Pennsylvania cities. The actual number of deaths in these selected cities' populations were compared with a calculated number of deaths for each city. These calculated deaths are the number of deaths expected from each city's population if that population had the same mortality rate as some standard population. For this exercise's purpose, the mortality rates of the whole Commonwealth were used as the standard. By multiplying each city's population by the Commonweath's rates for each cause of death, the expected number for each cause of death was obtained. This expected number was then divided into the actual number for each cause of death per city and multiplied by 100%. A number greater than 100% reflects an excess in actual deaths over expected deaths. A number less than 100% reflects less actual than expected deaths. And a ratio equal to 100% reflects no difference between the actual and expected deaths. For example, the 170% ratio for deaths from hypertension in the city of Chester means that there were 70% more deaths from hypertension in Chester than in the Commonwealth as a whole. These ratios are only estimates that cannot account for the muiltitude of factors that contribute to a particular population's mortality rate. Thus, caution should be used in interpreting these ratios. Specifically, one cannot determine a cause and effect relationship from any of these ratios. However, they do provide a valuable way of relatively quickly assessing and comparing disease burdens. For example, the ratio of 244% for deaths from liver disease in the city of Chester is red warning flag strongly indicating further investigation into this cause of death in this municipality.

Mortality Ratios (1992 Mortality Rates)

| | Chstr | Lncstr | Nrrstwn | Phila | Pbrgh |
|---|---|---|---|---|---|
| Blood Pressure | 170% | 109% | 122% | 179% | 149% |
| Heart Attack | 83% | 86% | 88% | 86% | 111% |
| Stroke | 149% | 96% | 113% | 105% | 116% |
| Emphysema | 129% | 145% | 124% | 91% | 136% |
| Diabetes | 84% | 161% | 100% | 108% | 108 |
| Liver Disease | 244% | 175% | 163% | 157% | 134% |
| Pnuemonia-Flu | 159% | 89% | 87% | 94% | 133% |
| Kidney Disease | 88% | 79% | 119% | 123% | 135% |